

This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

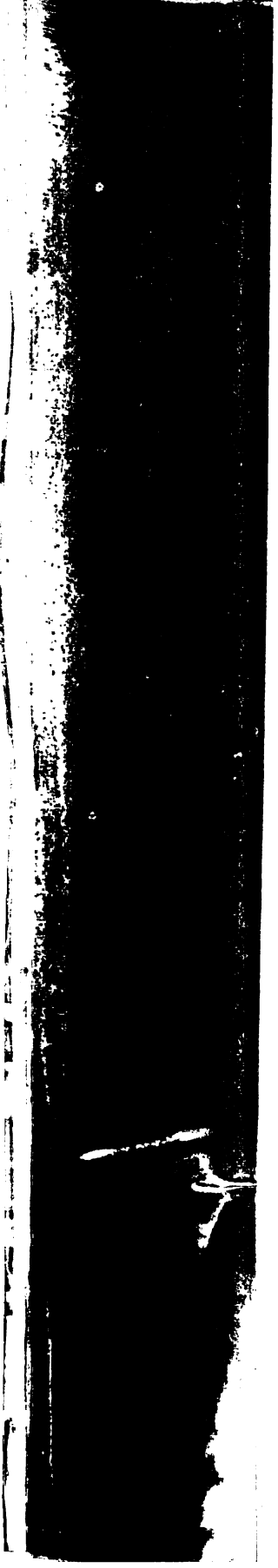
About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

18684

University of Wisconsin
LIBRARY
Class SVB
Book C91
2

Digitized by Google



UNIVERSITY OF WISCONSIN
No.
ENGINEERING LIBRARY.

Digitized by Google

Digitized by Google

ROORKEE

HYDRAULIC EXPERIMENTS.

BY

CAPT. ALLAN CUNNINGHAM, R.E.,

HONY. FELLOW OF KING'S COLLEGE, LONDON.

VOL. II.—TABLES.

PART I. DETAILED TABLES.

PART II. ABSTRACT TABLES.

ROORKEE:

PRINTED AND PUBLISHED AT THE THOMASON COLLEGE PRESS.

1880.

[*All rights reserved by the Secretary of State for India in Council*].

Digitized by Google

Experiments Staff.

Superintendent, ... Capt. Allan Cunningham, R.E.

Senior Observers, ... { Decr. '74—Aug. '77, Sergt. J. Warburton, R.A.
Sept. '77—April '79, Sergt. W. Porters, R.E.

Senior Computer and Checker, May '79—Novr. '80, Sergt. W. Porters, R.E.

[For detail of Observer and Computer Staff, see Text, Chap. II.]

ROORKEE:
THOS. D. BONA, SUPERINTENDENT,
THOMASON COLLEGE PRESS.

Digitized by Google

6492422

SVB
·C91
2

INTRODUCTION TO TABLES.

1. Division of Tables.—The Tables are divided into two parts—

Part I.—DETAILED TABLES, Nos. I.—LXXXVI., pages 1—156.
Part II.—ABSTRACT TABLES, Nos. 1—34, pages 1—49.

DETAILED TABLES. These contain the *details* of the whole of the Experimental data, and also such Results as depend directly on them.

ABSTRACT TABLES. These contain an Abstract of the principal Results (chiefly "Means" and "Ranges") from the Detailed Tables (VII.—LXX.), together with additional Results (mostly computed, not experimental details). Reference to these will be sufficient for most purposes, and so save reference to the Detailed Tables.

The two Parts bear separate numbering (of the Tables) and separate pagination, and have separate Tables of Contents preceding them.

2. Arrangement.—As a general Rule each *line* of the Tables is a single complete SET of Data and Results, whereof the Data were *specially observed together*, as rapidly as circumstances would permit. All such SETS of work of one kind as are *at nearly same water level*, and *do not differ greatly in the velocities*, are combined together into SERIES. The arrangement of each Class of Tables is explained in the Text: brief explanations are also given at pages 1, 13, 57, 67, 115, 141, 146, 152 of the Detailed Tables of the Class of Table following, and also at the top of many of the Abstract Tables.

3. Ranges and Means.—In most of the Tables the last two lines (marked δ, v) contain the "Range" (or difference between the greatest and least) of, and the "Mean" of, the *actual* entries in each Sub-Column.

[The entry "Means of 10, 16, &c.," at foot of each Series indicates strictly only the number of lines (or SETS) in the Series: the actual Mean in each Sub-Column is computed from the actual entries in it, which are sometimes fewer in number than the number of lines (or Sets) in the Series].

4. Queries (?).—Several distinct uses of queries occur:—

(i). *Queried Data.*—As a rule, doubtful observations have not been recorded at all. But occasionally the values of certain data obtained were in some way open to doubt, and yet *likely to be useful*, (even though somewhat imperfect). In all such cases the figured entry is queried; (thus, ? 3·46).

(ii). *Missing Data.*—Where space admitted, the words "not observed" (or some similar phrase) are printed. When the space was contracted, the place of a missing *primary* observation has been filled up with a query (?); this should be read simply as "not observed". In this case the secondary observations (required solely for use with the primary) would of course be *unnecessary*: the spaces usually occupied by them are filled up with leaders (..).

Digitized by Google

18184

(iii). *Queried Results.*—Results, such as Ranges, Means, Ratios, &c., depending on details of which some are either "doubtful" or "missing" (marked by a query as above) are themselves marked with a query, (indicating uncertainty). Again, Ranges and Means in any Sub-Column containing fewer entries than the rest of the Series are (though correctly computed from their own data) also queried, to indicate that they are *not perfectly comparable* with the rest of the Ranges and Means of the Series.

(iv). *Edge-velocity.*—Where required for insertion in Discharge-formulæ, this quantity has been assumed zero: where space admitted in the Sub-Column of Edge-velocity this is distinctly stated: where the space was very contracted, the entry ?0 has been made; this should be read as "assumed zero in computing Discharge".

5. Leaders (.. ..).—These have been used both to fill up gaps in the Tables, and also to guide the eye across the page.

These leaders (..)—when used to fill up gaps in the Tables—may be read to mean that "no figured entry is necessary in the space in question", (*see* Example in para. 4—(ii)).

6. Repeated Entries.—As a Rule all data required for each complete SET of Results were *independently obtained.* But it often happened that several SETS of velocity-work were done in one day, whilst other data required for use with them were obtained only once or twice in the day; these last data have thus had to be *used more than once* to make the entries in each line or SET complete.

To prevent such "repeated data" appearing to be independent observations, the entries are *repeated* by commas („), whenever they occur (as is usual) in successive lines.

[In a few cases only, the lines in question do not run in succession: in this case the "repeated data" have been printed in full in each line; this could not well be avoided. As a general Rule all data not repeated by commas may be looked on as *independent*].

7. Repetitions.—To save the eye in reading the Tables, much repetition of figures has been avoided in certain columns by omitting the repeated figures, leaving them to be supplied by the reader, as follows:—

Dates. The day, month, and year where repeated are *replaced* severally by commas („).

Gauge-Readings, and *Depths* (Central (H), Actual (H), at Gauge (*h*), Hydraulic Mean (R)). The leading integers when repeated are *omitted*, the decimal portion only being printed.

Surface-breadths (*b*), and *Wet Borders* (B). The leading integers when repeated are *omitted*, the decimal portion only being printed.

Surface-Slopes (S). The printed Slopes all contain only three figures: three decimals (·000) are in every case to be prefixed by the reader, *e.g.*, the printed 230 is to be read as ·000230.

Digitized by Google

8. **Algebraic Symbols.**—The following symbols are used *generally* throughout the Tables (with modifications where necessary). Short explanations of the symbols will be found at pages 1, 13, 57, 67, 115, 141, 146, 152 of the Detailed Tables.

Special symbols are also used in certain Tables, and will be found duly explained therewith.

SYMBOL.	MEANING.
z	Any depth below surface.
Z	Depth of maximum velocity past any vertical.
h	Gauge-Reading, Depth above datum, &c.
H	Central Depth, Depth on any vertical, &c.
R	Hydraulic Mean Depth.
k	Average depth of Obstruction at Falls at Tail of Reach.
l	Length of Connector, Length of Rod.
n	Number.
ζ	Value of $Z \div H$.
b, B	Surface-breadth, Wet Border.
A	Area.
p	Parameter of velocity-parabola.
F_1, F_2, F_3, F	Surface Fall in Upper, Middle, Lower Sub-Reach, and whole Reach.
S	Local Surface-Slope.
v, v_z, v_y	Velocity in general, or at depth z, or at abscissa y.
v_0, $v_{\frac{1}{2}H}$, v_H	Surface, Mid-depth, Bed Velocity (on any vertical).
v_0	Central Velocity, also Central Surface Velocity.
U	Mean Velocity past a vertical, or past a transversal.
U_0, $U_{\frac{1}{2}H}$, U_H	Mean Surface, Mean Mid-depth, Mean Bed Velocity.
U_0	Central Mean Velocity.
V	Maximum Velocity (on any vertical).
V	Mean (Sectional) Velocity.
u	Rod-Velocity.
u_m	Value of $\frac{1}{4}(v_0 + 3v_{\frac{1}{2}H})$.
w	Value of $100 \cdot \sqrt{RS}$.
D	Discharge past a vertical or past a transversal *in sq. ft. per sec.*
D	Cubic Discharge *in c. ft. per sec.*
Q	Withdrawal by Distributaries *in c. ft. per sec.*
C, C_b, C_k	Value of $\mathbf{V} \div w$ by Experiment, by Bazin's Rule, by Kutter's Rule.
C	Value of $U \div v_0$, or of $\mathbf{V} \div v_0$.
$\mathbf{C}_b$	Value of $100\,C \div (100\,C + 25{\cdot}34)$, (Bazin's Rule for **C**).
c	Value of $\mathbf{V} \div U_0$.
σ, σ_0	Silt-Density on any vertical, Central Silt-Density *in grs. per c. ft.*
s	Mean Silt-velocity past any vertical *in grs. per sq. ft. per sec.*
S	Total Silt-Discharge *in lbs. per sec.*

Digitized by Google

9. Abbreviation-Symbols.—Some symbols or single letters have also been used by way of abbreviation or with special meanings,—not as algebraic symbols.

SYMBOL.	MEANING.
δ, Δ	Range, Discrepancy.
C, T, W	Copper, Wood, Tin.
e, *t*, *q*, *m*	Edge, Top immersed Step, Quarter-point, Middle of Side-space.
L, R	Left, Right.
+, −	Water rose or fell, (in Column of "Variation").
+, −	Used with special meanings in certain Tables, as therein explained.
< >	[Detailed Tables **LXXV.-LXXVIII.**, Abstract Tables **26—31**].
N, E, S, W	Direction of Wind *referred to current-axis as N. S.-Line.*
V	Variable, (in Wind-direction column).
l, *b*, *h*, *g*	Light, Breeze, High, Gusts (in Wind-velocity column).
+	Used in Abstract Table **11** simply as a *separation* between formulæ.

10. Type.—Different kinds of type are employed for sake of distinctness usually (but with occasional modification) as follows :—

Numbering of Detailed Tables, Black letter Roman numerals, **I.—LXXXVI.**
„ „ Abstract Tables, Black letter Arabic numerals, **1—34.**
„ „ Series, Black letter Arabic numerals, **1—262.**

All the rest in Arabic numerals generally as follows :—
Number of Sets in old brevier, *e.g.*, 13.
Detailed Depths, and Detailed Velocities, in old face, *e.g.*, 9·87, 3·65.
Differences, Ranges, and Discrepancies, in old brevier, *e.g.*, ·07, 1·11.
Data of Canal Control, in old brevier, *e.g.*, 10, 173, ·67.
All other Quantities usually in brevier, *e.g.*, 15-4-'78, 9·35, 140·3, &c.
References to Tables, Series, &c., usually in same type as original.

11. Preparation of Tables.—The Tables have been prepared with great care : the system of checking used in the original preparation of the MS. is explained in the Text. In passing through the Press, every *Proof* has been read with the MS. by one of the Computer Staff, (as well as by the usual Press Readers). All corrections were verified in the "Revised Proofs" by the Press Readers, by one of the Computer Staff, and by the Superintendent himself.

12. Errata.—With every care, it has, however, been impossible to avoid mistakes altogether. A good many Errata* were discovered whilst the Work was passing through the Press. Some of the worst of these have been corrected in a hand-press† so as to save trouble to the reader ; these therefore no longer appear as Errata. A List of all the rest as far as known‡ is published below. The reader is requested to correct these with the pen.

* Many of these were due to faults of the original MS. ; many others to the difficulties attending the printing of so heavy a Work at a small Indian Press with native compositors.

† The corrections are of course a little rough in appearance.

‡ The Author will be glad to receive a note of any further Errata discovered. Address to the Thomason C. E. College, Roorkee, N. W. P., India.

Digitized by Google

ERRATA.

Detailed Tables.

Page.	Table.	Column.	Sub-Column.	Series.	Line of Series reckoned from		Erratum.	Corrections.
					Top.	Foot.		
30	XV	3	F_1	19	..	3	6·52	6·39
59	XXIX	7	D	52	..	last	327·7	326·7
61	XXX	7	D	53	9	..	483·3	348·3
68	XXXIV	3	F_3	102	top	..	·555	5·55
„	„	4	To	102	..	5	? ?	? ?0
71	XXXV	7	D	107	..	3	2,152	2,151
73	XXXVI	8	V	108	9	..	4·21	4·30
„	„	„	V	109	..	9	3·83	3·86
74	XXXVII	3	F_3	111	..	last	4·87	? 4·87
„	„	4	From	„	9	..	SW 6	SW 4
„	„	„	Both	„	..	last	NNW 1	N ½ W 1
„	„	6	41½L	„	..	last	3·17	? 3·17
78	XXXIX	3	S	118	3	..	224	„
80	XL	2	Varn.	127	1	..	·0	·00
„	„	3	S	„	..	8	195	„
88	XLIV	4	Both	160	..	last	W 4	W ½ S 4
91	XLV	8	V	165	4	..	4·60	2·46
96	XLVIII	2	R	179	..	2	·10	·15
99	XLIX	8	V	191	top	..	4·19	4·16
106	LIII	3	S	216	top	..	168	158
108	LIV	4	To	223	..	7	NW 11	NW 9
„	„	„	From	„	..	6	NW 8	NW 11
112	LVI	4	Both	231	..	2	.. 0 | .. 0	.. | ..
„	„	„	„	232	..	2	.. 0 | .. 0	.. | ..
120	LX	3	V	113 115	..	2	·16	·26
122	LXI	3	D	124	1	..	722·1	722·2
„	„	„	„	127	1	..	35·5	35·6
123	LXI	3	V	131	..	last	·74	1·24
„	„	3	D	„	..	last	482·0	481·9
„	„	4	C	„	..	last	·883	·838
124	LXII	4	R	151	..	last	? ·935	? 9·35
126	LXIII	4	C	160	..	2	? ·12	? ·012
129	LXIV	5	w	176	..	2	? ·03	? 1·03
130	LXV	4	C	193	..	2	? ·19	? ·019

Abstract Tables.

14	9	6	0	4	2	..	..	·07
„	„	„	0	12	2	..	·30	·44
45	31	2	Date	..	..	16	8-2	28-2

N.B.—Certain Misprints in Series Nos. 3, 5, 6, 7, 15R, 16R of the 1874-5 Report have been corrected on transfer to this Work. Details of the Misprints in the Old Work are not required, as it is superseded by this Work.

Digitized by Google

Digitized by Google

PART I.

DETAILED TABLES.

TABLES I.—LXXXVI.

Digitized by Google

PART I.—DETAILED TABLES.

Tables I.—LXXXVI.

These Tables contain the *details* of the whole of the experimental data and also such Results as depend directly on them.

ABSTRACT OF CONTENTS.

	Tables.	Pages.
Average Cross-Sections at the Experimental Sites, ..	I.—IV.,	1— 9
Hydraulic Elements at the principal (Solání) Sites, ..	V., VI.,	10— 12
Subsurface and Mean Velocities past a Vertical, ..	VII.—XXVIII.,	13— 56
Velocities past a Transversal, ...	XXIX.—XXXIII.,	57— 66
Mean Velocities and Cubic Discharges, ...	XXXIV.—LVI.,	67—113
Central Surface and Mean Velocities, ...	LVIII.—LXX.,	115—140
Miscellaneous Velocity Experiments, ...	LVII., LXXI.—LXXIV.,	114, 141—145
Water-Level, Surface-Convexity and Surface-Slope, ..	LXXV.—LXXXII.,	146—151
Silt and Evaporation, ...	LXXXIII.—LXXXVI.,	152—156

A detailed Table of Contents follows.

Digitized by Google

DETAILED TABLES,—CONTENTS.

Table.	Page.	TITLE, &c.
I–IV	1– 9	*Average Cross-Sections at the Experimental Sites.*
...	1	—— Explanation of Tables.
I	2– 3	—— at Fifteenth Mile and Solání Embankment Main Site.
II, III, IV	4– 9	—— at Belra, at Jaolí, and at Kamhera Sites.
V	10– 11	Hydraulic Elements at Solání Embankment Main Site.
VI	12	—— at Solání Right Aqueduct Site.
VII–XXVIII	13– 56	*Subsurface and Mean Velocities past a Vertical.*
...	13	—— Explanation of Tables.
VII–XIX	14– 39	Subsurface and Mean Velocities past a Central Vertical.
VII–VIII	14– 17	—— Series 1– 4, Solání Left Aqueduct.
IX–XIV	18– 29	—— „ 5–17, „ Right Aqueduct.
XV	30– 31	—— „ 18–20, „ Right Aqueduct, (L. Aqued. closed).
XVI–XIX	32– 39	—— „ 21–28, „ Embankment Main Site.
XX–XXVIII	40– 56	Subsurface and Mean Velocities past a Non-Central Vertical.
XX–XXV	40– 51	—— Series 29–40, Solání Right Aqueduct.
XXVI–XXVII	52– 55	—— „ 42–46, „ Embankment Main Site.
XXVIII	56	—— „ 41, „ Embankment Main Site.
XXIX–XXXIII	57– 66	*Velocities past a Transversal.*
...	57	—— Explanation of Tables.
XXIX	58– 59	Surface Velocities, Series 51–52, Solání Left Aqueduct.
XXX–XXXI	60– 63	„ „ „ 53–59, „ Right Aqueduct.
XXXII	64– 65	Mid-depth Velocities, „ 61–62, „ Right Aqueduct.
	64– 65	Bed Velocities, „ 65–66, „ Right Aqueduct.
XXXIII	66	Surface Velocities, „ 60, „ Embankment Minor Sites.
XXXIV–LVI	67–113	*Mean Velocities and Cubic Discharges.*
...	67	—— Explanation of Tables.
XXXIV–XXXV	68– 71	—— Series 101–107, Solání Left Aqueduct.
XXXVI–XL	72– 81	—— „ 108–127, „ Right Aqueduct.
XLI	82– 83	—— „ 131–139, „ Right Aqueduct, (L. Aqued. closed).
XLII–XLV	84– 91	—— „ 151–166, „ Embankment Main Site, High Water.
XLVI–XLVIII	92– 97	—— „ 167–181, „ „ „ Low Water.
XLIX	98– 99	—— „ 191–197, Fifteenth Mile Sites.
L–LI	100–103	—— „ 201–206, Belra Site.
LII–LIII	104–107	—— „ 211–217, Jaolí Site.
LIV–LV	108–111	—— „ 221–225, Kamhera Site.
LVI	112–113	—— „ 231–238, Distributaries.
LVII	114	Surface, Bed, and Mean Velocities and Discharges, Series 241–243.

Digitized by Google

Table.	Page.	TITLE, &c.
LVIII-LXX	115-140	*Central Surface and Mean Velocities.*
...	115	—— Explanation of Tables.
LVIII	116, 117	—— Series 101-107, Solání Left Aqueduct.
LIX-LXI	118-122	—— „ 108-127, „ Right Aqueduct.
LXI	123	—— „ 131-139, „ Right Aqueduct, (L. Aqued. closed).
LXII-LXIV	124-129	—— „ 151-181, „ Embankment Main Site.
LXV	130	—— „ 191-195, Fifteenth Mile, Old Site.
„	131	—— „ 196-197, „ „ New Site.
LXVI-LXVII	132-134	—— „ 201-206, Belra Site.
LXVII-LXVIII	135-137	—— „ 211-217, Jaolí Site.
LXIX	138, 139	—— „ 221-225, Kamhera Site.
LXX	140	—— „ 231-238, Distributaries.
LVII & LXXI-LXXIV	114 141-145	} *Miscellaneous Velocity Experiments.*
...	141	—— Explanation of Tables.
LXXI	142	—— Experiments on Length of Run, Series 251.
LXXII	143	—— „ „ „ „ 252.
LXXIII	144	—— Unsteady Motion, Central Surface Velocities.
LXXIV	145	—— „ „ Central Velocities.
LXXV-LXXXII	146-151	*Water-Level, Surface-Convexity, and Surface-Slope.*
...	146	—— Explanation of Tables.
LXXV	147	—— Still and Free Water-Levels.
LXXVI	148	—— Effect of Wind on Water-Level at Edges.
LXXVII	„	—— Convexity of Water Surface.
LXXVIII	149	—— „ „ „
LXXIX	150	—— Surface-Slope Measurements in 2000' & 4000' Slope-Lengths.
LXXX-LXXXI	„	—— Surface-Slope Measurements on both banks.
LXXXII	151	—— Simultaneous Local Surface-Slope Measurements.
LXXXIII-LXXXVI	152-156	*Silt and Evaporation.*
...	152	—— Explanation of Tables.
LXXXIII	153	—— Silt-Densities, -Velocities, and -Discharges, Series 261, 262.
LXXXIV	154	—— Silt-Densities, and -Discharges, Roorkee Reach.
LXXXV	155	—— „ „ „ „ Belra Reach.
LXXXVI	156	Evaporation at Solání Aqueduct and Kamhera Sites.

Digitized by Google

TABLES I.—IV.

Average Cross-Sections at the Experimental Sites.

15th Mile Site,	...	...	...	...	Table	I.
Solání Embankment Main Site,	...			...	,,	,,
Belra Site,	...	...	...	...	,,	II.
Jaolí Site,	...	...	...	...	,,	III.
Kamhera Site,	...	...	...	...	,,	IV.

Each Average Cross-Section is the mean of eight Cross-Sections obtained by sounding at eight places along each Float-Course or line of Pendants in the manner explained in the Text, (see Art. "Average Cross-Sections," *et seq.*)

Col. 3.—The figures in "old face type" (3·02) show the Average Height of the Bed above a certain Datum, obtained from eight soundings along a Float-Course.

Col. 3.—The figures in "old brevier type" (1·7) show the "Range" of the eight soundings, *i. e.*, the difference between the greatest and least depth along a Float-Course, and thus affords a measure of the roughness of the Bed.

Foot of Table.—The figures in italic type (*1·04*) show the variation of the Bed along a Float-Course during the whole Season, *i. e.*, the difference between the greatest and least Average Heights in that Float-Course.

TABLES V., VI.

Hydraulic Elements at the principal Sites.

[*Argument.*—Height of Water-Level above Datum = h].

[Central Depth = H, Surface-breadth = b, Wet Border = P, Area = A, Hyd. Mean Depth = R].

Solání Embankment Main Site,	...	Table V.
Solání Right Aqueduct Site,...	...	Table VI.

Digitized by Google

AVERAGE

[*Instrument*—

15TH MILE

Site.	1 Date, 1878-79.	2 Water Level. Above Datum. h	Variation.	Central Depth. H	3 Average Heights. N.B.—The Datum is 20′ Each Average Cross-Section is a The "Range" is the difference between greatest. Left of centre. 85	82½	80	75	70	65	60	40	20	Centre.
OLD SITE.	28-3-'78	13·91	+ ·01	9·59	12·22	10·96	9·92	8·33	7·06	5·75	5·45	3·13	3·02	4·32
	Range*	..	..	..	·9	1·0	·7	1·4	1·7	·7	·1	·6	2·0	1·1
	31-5-'78	15·30	+ ·03	11·31	11·92	11·07	9·95	8·44	7·29	5·94	5·46	3·37	4·24	3·99
	Range*	..	..	..	·6	·7	1·4	1·6	·5	·8	·3	1·4	2·7	2·1
Range of Average Heights, ..					*·30*	*·11*	*·03*	*·11*	*·23*	*·19*	*·01*	*·24*	*1·22*	*·33*
NEW SITE.	16-12-'78	15·29	− ·04	9·85	..	..	6·20	5·95	5·86	5·68	5·40	5·31	5·29	5·44
	Range*	..	..	..	..	..	·6	·3	·5	·4	·5	·8	1·5	1·0
	28-4-'79	15·33	+ ·02	10·36	..	..	6·70	6·03	5·92	5·85	5·78	5·43	5·28	4·97
	Range*	..	..	..	..	..	·9	·4	·3	·6	·3	1·2	1·5	2·9
Range of Average Heights, ..					..	..	*·50*	*·08*	*·06*	*·17*	*·38*	*·12*	*·01*	*·47*

SOLÁNÍ EMBANK-

Site.	Date, 1876-78.	Above Datum. h	Variation.	Central Depth. H	Average Heights of Bed. N.B.—The Lower Datum is 3′ below the. Left of centre.	75	73¾	72½	70	65	60	40	20	Centre.
449′ S. OF 17TH MILE.	15-8-'76	2·26	?	3·44	..	2·62	2·64	2·39	2·20	1·92	2·06	1·58	1·62	1·82
	Range*	..	..	..	..	·51	?	?	·46	·45	·44	·20	·52	·90
	4-6-'78	10·04	·00	11·24	..	2·69	?	?	2·19	1·84	1·90	·76	1·39	1·80
	Range*	..	..	..	..	·90			·60	·60	1·20	1·50	1·20	·70
	28-9-'78	3·13	− ·04	3·57	..	3·28	3·21	3·10	3·05	3·00	2·84	2·41	2·43	2·56
	Range*	..	..	..	..	1·25	1·10	·65	·25	·70	·70	·62	·45	·70
	13-11-'78	9·19	·00	10·03	..	2·61	2·53	2·53	2·19	2·19	2·06	1·09	1·41	2·16
	Range*	..	..	..	..	1·00	·80	·60	·30	·40	1·20	1·40	2·00	1·50
	16-12-'78	10·03	− ·04	11·06	..	2·64	?	?	2·40	2·15	2·19	·63	1·68	1·97
	Range*	..	..	..	..	·70			1·00	1·20	1·20	1·80	1·60	·80
Range of Average Heights, ..					..	*·67*	? *·65*	? *·71*	*·86*	*1·16*	*·94*	*1·78*	*1·04*	*·76*

Digitized by Google

CROSS-SECTIONS.

TABLE I.

15′ *Sounding Rod*].

SITE.

OF BED ABOVE DATUM. below 15th mile plinth. the Mean of eight Cross-Sections. and least soundings along a Float-Course.									4				5
Right of centre.									Surface-Breadth.	Wet Border.	Area.	Hyd. Mean Depth.	Reference to Plates.
20	40	60	65	70	75	80	82½	85	*b*	B	A	R	
4·66 1·5	4·71 2·2	5·97 ·7	6·37 ·8	6·56 ·9	7·22 1·9	8·95 1·0	9·31 ·6	10·31 1·5	174·9	179·2	1484·4	8·29	Pl. II., Fig. 1.
4·77 1·6	4·92 1·5	6·40 ·3	6·55 ·7	6·76 1·0	7·54 2·9	9·07 1·3	9·44 1·1	9·82 1·6	174·9	181·6	1706·5	9·40	..
·11	*·21*	*·43*	*·18*	*·20*	*·32*	*·12*	*·13*	*·49*	..	..	..	..	..
5·46 ·3	5·39 ·3	5·64 ·4	5·70 ·3	5·80 ·4	5·86 ·3	6·04 1·0	..	..	186·3	192·1	1687·1	8·78	Pl. II., Fig. 1.
5·50 1·5	5·28 ·7	5·73 ·3	5·83 ·4	5·75 ·4	5·88 ·3	5·98 ·2	..	..	186·0	191·7	1700·0	8·87	..
·04	*·11*	*·09*	*·13*	*·05*	*·02*	*·06*	..	..	..	..	..	..	..

MENT MAIN SITE.

ABOVE LOWER DATUM. Upper Datum or original Bed-level.									Surface-Breadth	Wet Border.	Area.	Hyd. M. Depth.	Reference to Plates.
Right of centre.													
20	40	60	65	70	72½	73¾	75		*b*	B	A	R	
1·26 1·00	1·05 ·60	1·36 1·53	2·06 ·70	2·34 ·40	2·11 ?	2·24 ?	2·34 ·18	..	150·0	155·7	543·1	3·49	Pl. II., Fig. 2.
1·49 1·10	1·85 1·80	1·20 1·30	2·23 1·00	2·24 ·50	?	?	2·35 ·90	..	171·0	192·2	1809·3	9·41	..
2·05 ·95	2·05 ·50	2·07 ·80	2·37 ·30	2·50 1·00	2·69 ·85	2·79 ·97	3·03 1·13	..	150·0	156·1	554·7	3·55	..
1·83 1·50	1·06 1·60	1·23 1·90	2·19 ·70	2·38 ·80	2·45 ·90	2·48 1·00	2·69 1·00	..	167·5	186·7	1628·9	8·72	Pl. II., Fig. 2.
1·24 1·00	·87 2·50	1·29 2·40	2·02 ·40	2·35 ·70	?	?	2·40 1·00	..	171·0	200·9	1799·2	8·96	..
·81	*1·18*	*·87*	*·35*	*·26*	*? ·58*	*? ·55*	*·69*	..	..	..	..	..	..

Digitized by Google

AVERAGE

[*Instrument—*

BELRA

Site.	1 Date, 1879.	2 Water Level. At Gauge. h	Variation.	Central Depth. H	3 Average Heights. The Datum is 4′. Each Average Cross-Section is. * The "Range" is the difference between greatest. Left of centre.			90	80	70	60	40	20	Centre.
BELRA.	8-1-'79	7·52	·00	9·65	..	..	..	5·11	2·01	1·69	1·74	2·02	1·39	1·87
	Range*	..	..	..	..	..	..	2·4	2·0	1·1	1·3	1·4	1·0	1·2
	13-1-'79	6·71	− ·40	8·90	..	..	..	4·75	1·86	2·01	1·81	1·88	1·67	1·81
	Range*	..	..	..	..	..	..	1·6	1·0	·9	1·1	1·4	1·1	1·1
	20-1-'79	7·05	·00	9·71	..	..	..	4·92	1·97	1·82	1·77	1·91	1·90	1·34
	Range*	..	..	..	..	..	..	1·3	1·9	1·1	1·3	1·5	·5	1·5
	29-1-'79	6·39	+ ·03	8·71	..	..	..	4·50	2·01	1·83	2·06	1·94	1·85	1·68
	Range*	..	..	..	..	..	..	·4	1·7	1·0	1·2	1·0	1·2	1·8
	5-2-'79	6·28	·00	8·54	..	..	..	4·42	2·03	1·82	2·00	1·79	1·65	1·74
	Range*	..	..	..	..	..	..	·3	2·2	1·0	1·1	1·4	1·0	1·3
	12-2-'79	5·89	− ·02	8·13	..	..	..	4·60	1·91	1·74	1·61	1·81	1·83	1·76
	Range*	..	..	..	..	..	..	1·0	2·0	·7	1·2	·8	·8	·6
	19-2-'79	6·50	+ ·04	8·69	..	..	..	4·44	1·75	1·70	1·70	1·69	1·75	1·81
	Range*	..	..	..	..	..	..	1·1	1·8	·9	1·1	·9	1·3	1·0
	26-2-'79	6·63	− ·03	8·86	..	..	..	4·58	1·78	1·60	1·72	1·68	1·75	1·77
	Range*	..	..	..	..	..	..	1·0	1·9	1·2	·2	·8	1·5	1·2
	5-3-'79	5·94	·00	8·23	..	..	..	4·41	1·66	1·61	1·95	1·76	1·76	1·71
	Range*	..	..	..	..	..	..	·6	1·7	·7	·5	·6	1·1	1·0
	12-3-'79	5·60	·00	7·83	..	..	..	4·42	1·74	1·64	1·72	1·77	1·77	1·77
	Range*	..	..	..	..	..	..	1·2	1·4	·6	·6	·7	·8	·5
	19-3-'79	7·02	− ·04	9·21	..	..	..	4·28	1·73	1·59	1·82	1·66	1·69	1·81
	Range*	..	..	..	..	..	..	·7	2·1	·7	·9	1·1	1·2	·4
	26-3-'79	7·23	− ·05	9·58	..	..	..	4·64	1·68	1·69	1·45	1·57	1·83	1·65
	Range*	..	..	..	..	..	..	·9	1·8	·6	1·0	·9	1·1	·9
Range of Average Heights,		..	..	..	..	..	..	*·83*	*·37*	*·42*	*·61*	*·45*	*·51*	*·53*

Digitized by Google

CROSS-SECTIONS. **TABLE II.**

15′ *Sounding Rod*].

SITE.

OF BED ABOVE DATUM. below Gauge-Zero. the Mean of eight Cross-Sections. and least soundings along a Float-Course.									4				5
Right of centre.									Surface-Breadth.	Wet Border.	Area.	Hyd. Mean Depth.	Reference to Plates.
20	40	60	70	80	90				*b*	B	A	R	
1·39	1·24	1·04	1·16	1·81	5·51	..	..	..	188·5	196·3	1776·3	9·05	Pl. IV., Fig. 3.
2·0	1·6	1·1	·8	2·1	3·8	..	..	..					
1·68	1·31	1·30	1·13	1·68	5·15	..	..	..	187·7	194·9	1626·4	8·35	
·7	·8	·8	1·1	1·8	2·3	..	..	..					
1·49	1·07	1·37	·89	1·70	5·07	..	..	..	188·0	195·6	1715·5	8·77	
1·6	1·2	1·0	2·0	1·9	2·3	..	..	..					
1·64	1·44	1·23	1·45	1·76	4·45	..	..	..	187·4	194·6	1564·3	8·04	
·5	1·1	1·5	·8	2·0	1·7	..	..	..					
1·44	1·25	1·40	1·24	1·82	4·47	..	..	..	187·3	194·4	1555·0	8·00	
1·3	1·0	1·5	·7	1·5	1·2	..	..	..					
1·56	1·38	1·45	1·61	1·74	4·71	..	..	..	186·9	193·3	1475·3	7·63	
·7	·8	·7	·9	1·7	1·4	..	..	..					
1·51	1·32	1·29	1·37	1·74	4·81	..	..	..	187·5	194·8	1599·4	8·21	
1·2	1·5	1·1	·8	1·9	1·0	..	..	..					
1·52	1·18	1·47	1·20	1·69	4·59	..	..	..	187·6	194·7	1631·3	8·38	
1·0	·8	·8	1·0	1·5	1·2	..	..	..					
1·49	1·35	1·58	1·44	1·80	4.80	..	..	..	186·9	193·6	1491.2	7·70	
1·0	1·0	·8	·9	1·6	1·7	..	..	..					
1·56	1·64	1·59	1·79	1·76	4·61	..	..	..	186·6	192·9	1414·7	7·33	Pl. IV., Fig. 3.
·9	·5	·6	·9	1·1	1·5	..	..	..					
1·28	1·17	1·38	1·28	1·61	4·96	..	..	..	188·0	196·0	1705·7	8·70	
·6	1·5	1·3	1·5	1·8	1·8	..	..	..					
1·47	1·23	1·57	·97	1·60	4·99	..	..	..	188·2	196·3	1752·2	8·93	
1·1	1·3	1·2	1·4	1·9	2·4	..	..	..					
·40	*·57*	*·55*	*·90*	*·22*	*1·06*	..	..	..	..	..	..	..	

Digitized by Google

AVERAGE

[*Instrument*—

JAOLI

Site.	1 Date, 1879.	2 Water Level. At Gauge, h	Variation.	Central Depth, H		3 Average Heights. The Datum is 3′. Each Average Cross-Section is. * The "Range" is the difference between greatest. Left of centre. 92½	87½	82½	75	67½	60	40	20	Centre.
JAOLI.	4-1-'79	7·04	+·04	8·43	..	3·33	3·08	2·60	1·93	2·04	2·11	1·93	1·73	1·61
	Range*	..	..	..	..	·6	1·0	·9	1·0	·7	·8	·9	1·1	·7
	13-1-'79	6·55	−·26	7·64	..	3·21	3·06	2·67	1·75	2·01	1·95	1·65	1·86	1·91
	Range*	..	..	..	..	·5	·7	1·5	1·0	·8	·9	·9	·8	·6
	20-1-'79	6·80	−·02	8·23	..	3·10	3·14	2·70	1·80	1·76	1·87	1·67	1·65	1·57
	Range*	..	..	..	..	·6	·5	1·5	·9	·6	·5	·8	·8	·7
	29-1-'79	5·86	−·04	7·19	..	3·31	3·10	2·62	1·61	1·66	1·61	1·72	1·70	1·67
	Range*	..	..	..	..	·8	·9	1·4	·4	·5	·7	·5	·2	·6
	5-2-'79	5·58	−·06	6·93	..	3·34	3·15	2·59	1·72	1·70	1·77	1·70	1·60	1·65
	Range*	..	..	..	..	·6	·6	1·4	1·1	·4	·3	·3	·3	·3
	12-2-'79	5·40	·00	6·86	..	3·30	3·16	2·56	1·60	1·56	1·57	1·65	1·59	1·54
	Range*	..	..	..	..	·6	·6	1·2	1·0	·3	·2	·2	·2	·4
	19-2-'79	6·30	·00	7·65	..	3·34	3·21	2·49	1·69	1·70	1·67	1·64	1·65	1·65
	Range*	..	..	..	..	·6	·6	1·6	·8	·5	·6	·2	·5	·6
	26-2-'79	6·35	+·02	7·73	..	3·34	3·20	2·52	1·66	1·61	1·60	1·80	1·57	1·62
	Range*	..	..	..	..	·5	·5	1·5	1·0	·7	·7	·5	·2	·7
	5-3-'79	5·63	·00	7·03	..	3·30	3·18	2·40	1·70	1·60	1·64	1·58	1·64	1·60
	Range*	..	..	..	..	·5	·4	1·6	1·2	·4	·6	·5	·3	·3
	12-3-'79	5·15	·00	6·66	..	3·27	3·07	2·42	1·57	1·52	1·51	1·54	1·50	1·49
	Range*	..	..	..	..	·6	·6	1·4	1·1	·5	·5	·3	·3	·1
	19-3-'79	6·69	+·02	8·04	..	3·33	3·10	2·51	1·80	1·70	1·69	1·65	1·69	1·65
	Range*	..	..	..	..	·8	1·0	1·7	·9	·5	·6	·8	·5	·7
	26-3-'79	7·00	−·06	8·29	..	3·31	3·07	2.34	1·71	1·70	1·75	1·79	1·84	1·71
	Range*	..	..	..	..	·9	·9	1·6	1·1	·6	·6	·7	·7	·9
Range of Average Heights,					..	·24	·15	·36	·36	·52	·60	·39	·36	·42

Digitized by Google

CROSS-SECTIONS. TABLE III.

15′ *Sounding Rod*].

SITE.

OF BED ABOVE DATUM. below Gauge-Zero. the Mean of eight Cross-Sections. and least soundings along a Float-Course.									4				5
Right of centre.									Surface-Breadth.	Wet Border.	Area.	Hyd. Mean Depth.	References to Plates.
20	40	60	67½	75	82½	87½	92½		b	B	A	R	
1·75 1·3	1·51 ·8	1·16 1·1	1·40 ·5	1·76 3·2	3·06 2·3	3·53 1·3	4·34 1·6	..	192·6	199·8	1527·7	7·64	Pl. V., Fig. 3.
1·89 ·7	1·62 ·9	1·20 ·6	1·22 ·4	1·67 2·8	3·01 2·7	3·67 1·8	4·39 1·4	..	192·1	198·8	1431·0	7·20	
1·72 ·3	1·52 ·6	1·32 ·6	1·24 ·4	1·79 2·8	2·97 2·5	3·65 1·8	4·40 1·5	..	192·4	199·5	1496·0	7·50	
1·61 ·5	1·43 ·7	1·21 ·7	1·18 ·8	1·73 2·8	2·87 3·2	3·57 1·6	4·36 1·5	..	191·4	197·3	1321·9	6·70	
1·48 ·7	1·44 ·4	1·08 ·6	1·15 ·6	1·64 3·6	3·14 2·2	3·75 1·0	4·37 1·8	..	191·1	196·6	1280·8	6·51	
1·45 ·3	1·34 ·3	1·10 ·5	1·09 ·6	1·60 2·6	2·91 2·7	3·54 1·9	4·30 1·7	..	191·0	196·1	1249·6	6·37	
1·41 ·4	1·31 ·6	1·17 ·6	1·05 ·5	1·50 2·2	2·92 2·8	3·56 1·8	4·34 1·6	..	191·9	198·2	1415·7	7·14	
1·45 ·6	1·35 ·9	1·17 ·7	1·09 ·8	1·72 2·9	2·86 2·9	3·66 1·6	4·29 1·4	..	191·9	198·2	1419·7	7·16	
1·50 ·2	1·43 ·4	1·17 ·5	1·07 ·6	1·53 2·7	2·87 2·5	3·59 1·7	4·29 1·4	..	191·2	196·8	1288·8	6·55	
1·34 ·6	1·30 ·4	1·04 ·5	·99 ·7	1·54 2·9	2·97 2·5	3·59 1·6	4·25 1·7	..	190·7	195·8	1213·4	6·20	Pl. V., Fig. 3.
1·55 ·7	1·24 ·7	1·00 ·8	1·10 ·8	1·60 3·1	2·88 2·7	3·54 1·8	4·28 1·4	..	192·2	199·1	1491·8	7·49	
1·56 ·9	1·50 1·0	1·04 ·8	1·97 ·8	1·60 ·29	2·92 2·7	3·46 1·8	4·30 1·3	..	192·6	199·9	1537·9	7·70	
·55	*·38*	*·32*	*·43*	*·29*	*·28*	*·29*	*·15*	..	..	..	..	..	

Digitized by Google

AVERAGE

[*Instrument—*

KAMHERA

Site.	1 Date, 1879.	2 Water Level. At Gauge. h	Variation.	Central Depth. H		3 Average Heights of Bed. Each Average Cross-Section is. * The "Range" is the difference between greatest. Left of centre. m	27½	25	22½	20	15	10	5	Centre.
Kamhera.	1-1-'79	6·02	·00	5·26	..	3·34	1·93	1·12	·87	·91	·74	·72	·89	·76
	Range*	..	..	..	..	1·9	1·3	·5	·9	·4	1·3	1·1	·6	1·2
	13-1-'79	5·80	– ·03	4·91	..	3·34	1·87	1·00	·92	·92	·79	·82	·86	·89
	Range*	..	..	..	..	2·1	1·6	·8	·5	·4	·6	·4	·6	·5
	20-1-'79	5·63	·00	4·88	..	3·28	1·78	·98	·95	·92	·93	·88	·79	·75
	Range*	..	..	..	..	1·6	1·3	·5	·7	·6	·9	·6	·6	·8
	29-1-'79	6·12	·00	5·20	..	3·29	1·83	·93	·88	·81	·71	·92	1·04	·92
	Range*	..	..	..	..	2·7	1·7	·4	1·1	1·0	·9	1·0	1·0	·8
	5-2-'79	6·44	·00	5·54	..	3·21	1·78	1·03	·90	·94	·93	·91	·96	·90
	Range*	..	..	..	..	2·4	1·7	·4	·8	·7	1·0	2·0	·4	·5
	12-2-'79	5·57	– ·03	4·86	..	3·17	1·82	·89	·77	·84	·58	·87	·83	·71
	Range*	..	..	..	..	2·4	1·8	·6	·8	·8	·6	·6	·9	1·1
	19-2-'79	5·39	·00	4·69	..	2·95	1·56	·81	·61	·64	·68	·81	·71	·70
	Range*	..	..	..	..	2·5	1·9	·7	·6	·4	·6	·4	·5	·6
	26-2-'79	5·97	– ·10	5·18	..	3·09	1·72	·78	·71	·79	·63	·8	·84	·79
	Range*	..	..	..	..	2·6	1·7	·5	1·0	·9	1·1	·4	·4	·5
	5-3-'79	5·30	·00	4·55	..	2·82	1·80	·89	·70	·57	·65	·56	·71	·75
	Range*	..	..	..	..	2·9	1·9	·6	·6	·8	·6	·6	·6	·6
	12-3-'79	5·39	·00	4·50	..	3·11	1·64	·93	·68	·70	·75	·68	·69	·89
	Range*	..	..	..	..	2·5	2·0	·7	1·1	1·1	·8	·7	1·0	·8
	19-3-'79	5·22	– ·01	4·75	..	2·96	1·84	·88	·73	·66	·49	·63	·66	·47
	Range*	..	..	..	..	2·8	1·9	·4	·6	·6	·4	·8	·6	1·1
	2-3-'79	5·61	·00	4·99	..	3·02	1·62	·76	·70	·68	·65	·60	·72	·62
	Range*	..	..	..	..	3·0	1·6	·7	·7	·8	·8	·5	1·1	·7
Range of Average Heights,					..	·52	·37	·36	·34	·35	·44	·36	·38	·45

Digitized by Google

TABLE IV.

CROSS-SECTIONS.

11′ *Sounding Rod*].

SITE.

ABOVE GAUGE-ZERO. the Mean of eight Cross-Sections, and least soundings along a Float-Course.									4				5
									Surface-Breadth.	Wet Border.	Area.	Hyd. Mean Depth.	Reference to Plates.
Right of centre.													
5	10	15	20	22½	25	27½	m		b	B	A	R	
·92	·81	·97	·92	·89	·98	1·73	3·53	..	65·0	68·4	305·2	4·46	
1·1	1·1	·5	·4	·7	·8	1·5	1·3	..					
·92	·94	·81	·91	·94	·91	1·89	3·94	..	64·6	67·8	288·8	4·26	
·6	·5	·5	·4	·5	·2	·8	1·5	..					
·73	·79	·75	·78	·80	·89	1·85	3·74	..	64·3	67·4	281·3	4·18	
·5	1·2	·8	·5	·5	·4	·9	1·1	..					
·81	·64	·76	·78	·82	·84	1·71	3·94	..	65·8	68·8	313·6	4·55	
·8	1·1	1·0	·7	·9	·6	·7	·4	..					
·88	·75	·69	·69	·65	·81	1·64	3·69	..	65·4	69·4	334·5	4·82	Pl. VI., Fig. 3.
·8	·5	·4	1·0	·6	·8	·7	1·2	..					
·84	·59	·79	·72	·69	·78	1·58	3·51	..	64·2	67·4	282·4	4·19	
·8	·8	·5	·4	·4	·3	1·2	1·2	..					
·61	·73	·49	·64	·63	·64	1·45	3·58	..	64·1	67·3	277·5	4·12	
·7	·4	·8	·3	·3	·4	1·0	1·0	..					
·62	·62	·76	·67	·74	·72	1·47	3·93	..	65·2	68·8	310·9	4·52	
1·0	·7	·9	·7	·6	·4	·7	1·5	..					
·62	·74	·77	·60	·55	·61	1·45	3·52	..	64·0	67·1	270·8	4·04	
·4	·6	·5	·5	·5	·4	1·4	1·5	..					
·58	·65	·49	·63	·48	·55	1·40	3·75	..	64·2	67·3	276·5	4·11	
·5	·6	1·2	·5	·3	·4	1·1	1·8	..					
·62	·59	·63	·53	·52	·67	1·36	3·57	..	63·9	66·9	268·5	4·02	Pl. VI., Fig. 3.
·6	·3	·4	·6	·5	·5	·6	·8	..					
·75	·76	·57	·56	·55	·61	1·38	3·71	..	64·5	67·9	291·3	4·29	
·8	·9	·8	·8	·6	·5	·8	1·2	..					
·34	*·35*	*·48*	*·39*	*·46*	*·43*	*·53*	*·43*	..	..	..	..	..	

Digitized by Google

HYDRAULIC ELEMENTS. TABLE V.

Solání Embankment Main Site. Period, Sept. 1876 to 24th Aug. 1878.

For References, see next page.

h	H	b	B	A	R	Tread. Bank.	h	H	b	B	A	R	Tread. Bank.
·35	1·53	150·0	151·8	256·6	1·69		6·30	7·48	159·3	173·1	1161·0	6·71	
1·84	3·02	·0	154·8	480·1	3·10		·40	·58	·3	·3	1176·9	·79	
·85	·03	·0	·8	481·6	·11		·50	·68	·3	·5	1192·8	·88	
·99	·17	·0	155·1	502·6	·24		·60	·78	·3	·7	1208·8	·96	
2·00	·18	·0	·1	504·1	·25		·70	·88	·3	·9	1224·7	7·04	
·30	·48	·0	·7	549·1	·53		·80	·98	·3	174·1	1240·6	·13	
·33	·51	·0	·8	553·6	·55		·83	8·01	·3	·1	1245·4	·15	8th, R
·40	·58	·0	·9	564·1	·61		·84	·02	160·5	175·3	1247·0	·11	
·47	·65	·0	156·1	574·6	·68		·90	·08	·5	·5	1256·7	·16	
·49	·67	·0	·1	577·6	·70		·97	·15	·5	·6	1267·9	·22	8th, L
·55	·73	·0	·2	586·6	·75		·98	·16	161·7	176·8	1269·5	·18	
·87	4·05	·0	·9	634·6	4·05		7·00	·18	·7	·8	1272·7	·20	
·90	·08	·0	·9	639·1	·07		·10	·28	·7	177·0	1288·9	·28	
·91	·09	·0	157·0	640·6	·08		·20	·38	·7	·2	1305·1	·36	
·92	·10	·0	·0	642·1	·09		·30	·48	·7	·4	1321·2	·44	
3·04	·22	·0	·2	660·1	·20		·40	·58	·7	·6	1337·4	·53	
·40	·58	·0	·9	714·1	·52		·50	·68	·7	·8	1353·6	·61	
·50	·68	·0	158·1	729·1	·61		·55	·73	·7	·9	1361·7	·65	7th, R
·60	·78	·0	·3	744·1	·70		·56	·74	162·8	179.1	1363·3	·61	
·70	·88	·0	·5	759·1	·79		·60	·78	·8	·2	1369·8	·64	
·80	·98	·0	·7	774·1	·88		·70	·88	·8	·4	1386·1	·73	
·85	5·03	·0	·8	781·6	·92	12th, R	·71	·89	·8	·4	1387·7	·74	7th, L
·86	·04	151·2	160·0	783·2	·99		·72	·90	164·0	180·6	1389·4	·69	
·90	·08	·2	·1	789·2	·93		·80	·98	·0	·7	1402·5	·76	
4·00	·18	·2	·3	804·3	5·02	12th, L	·90	9·08	·0	·9	1418·9	·84	
·01	·19	152·3	161·5	805·8	4·99		8·00	·18	·0	181·1	1435·3	·92	
·10	·28	·3	·7	819·6	5·07		·10	·28	·0	·3	1451·7	8·00	
·20	·38	·3	·9	834·8	·16		·20	·38	·0	·5	1468·1	·08	
·30	·48	·3	162·1	850·0	·24		·29	·47	·0	·7	1482·8	·16	6th, R
·40	·58	·3	·3	865·3	·33		·30	·48	165·2	182·9	1484·5	·12	
·50	·68	·3	·5	880·5	·42		·40	·58	·2	183·1	1501·0	·20	
·59	·77	·3	·7	894·2	·50	11th, R	·47	·65	·2	·3	1512·6	·25	6th, L
·60	·78	153·5	163·8	895·7	·47		·48	·66	166·3	184·4	1514·2	·21	
·70	·88	·5	164·0	911·1	·55		·50	·68	·3	·5	1517·6	·23	
·73	·91	·5	·1	915·7	·58	11th, L	·60	·78	·3	·7	1534·2	·30	
·74	·92	154·7	165·3	917·2	·55		·70	·88	·3	·9	1550·8	·38	
·80	·98	·7	·4	926·5	·60		·80	·98	·3	185·1	1567·5	·47	
·90	6·08	·7	·6	942·0	·69		·90	10·08	·3	·3	1584·1	·55	
5·00	·18	·7	·8	957·5	·78		9·00	·18	·3	·5	1600·7	·63	
·10	·28	·7	166·0	972·9	·86		·01	·19	·3	·5	1602·4	·64	5th, R
·20	·38	·7	·2	988·4	·95		·02	·20	167·5	186·7	1604·1	·59	
·30	·48	·7	·4	1003·9	6·04		·10	·28	·5	·8	1617·5	·65	
·35	·53	·7	·5	1011·6	·08	10th, R	·20	·38	·5	187·0	1634·2	·74	5th, L
·36	·54	155·8	167·7	1013·1	·04		·21	·39	168·7	188·2	1635·9	·69	
·40	·58	·8	·8	1019·4	·08		·30	·48	·7	·4	1651·1	·76	
·47	·65	·8	·9	1030·3	·14	10th, L	·40	·58	·7	·6	1667·9	·84	
·48	·66	157·0	169·1	1031·9	·10		·50	·68	·7	·8	1684·8	·92	
·50	·68	·0	·1	1035·0	·12		·60	·78	·7	189·0	1701·7	9·00	
·60	·78	·0	·3	1050·7	·20		·70	·88	·7	·2	1718·5	·08	
·70	·88	·0	·5	1066·4	·29		·76	·94	·7	·3	1728·7	·13	4th, R
·80	·98	·0	·7	1082·1	·37		·77	·95	169·8	190·5	1730·4	·08	
·90	7·08	·0	·9	1097·8	·46		·80	·98	·8	·6	1735·5	·11	
6·00	·18	·0	170·1	1113·5	·54		·90	11·08	·8	·8	1752·4	·19	
·07	·25	·0	·3	1124·5	·60	9th, R	·95	·13	·8	·9	1760·9	·23	4th, L
·08	·26	158·2	171·5	1126·1	·57		·96	·14	171·0	192·1	1762·6	·18	
·10	·28	·2	·5	1129·2	·59		10·00	·18	·0	·1	1769·5	·21	
·20	·38	·2	·7	1145·0	·67	9th, L	·05	·23	·0	·2	1778·0	·25	
·21	·39	159·3	172·9	1146·6	·63								

Digitized by Google

TABLE V, (*continued*).

For Cross-Section, see Plate II., Fig. 2.

The Treads of the 12 steps on each bank are numbered from the top (No. 1) downwards to the lowest (No. 12).

Argument.—h = Height above Datum.

H = Central Depth, b = Surface-Breadth, B = Wet Border, A = Area, R = Hydraulic Mean Depth

Solání Embankment Main Site. Period, 24th Aug. '78 to April '79.

h	H	b	B	A	R	Remarks. Depth below Tread of 12th Step on left bank.	Date.
1·64	2·27	150·0	153·2	342·5	2·24	2·36 below 12th	18- 9-'78
·69	·32	·0	·3	350·0	·28	2·31 „ „	19- „ „
2·82	3·26	·0	155·4	508·3	3·27	1·18 „ „	24- „ „
·83	·27	·0	·5	509·8	·28	1·17 „ „	26- „ „
3·44	·88	·0	156·7	601·3	·84	·56 „ „	4-10- „
·47	·91	·0	·7	605·8	·86	·53 „ „	3- „ „
·49	·93	·0	·8	608·8	·88	·51 „ „	8- „ „

h	H	b	B	A	R	Remarks. Height above Tread of Step on left bank.	Date.
8·29	9·32	164·0	181·7	1508·3	8·30	·57 above 7th	2- 4-'79
·82	·66	166·3	184·8	1567·6	·48	·35 „ 6th	28-10-'78
9·08	10·11	167·5	186·8	1638·7	·77	·61 „ „	7-12- „
·43	·46	168·7	188·7	1698·5	9·00	·23 „ 5th	15- 4-'79
·57	·41	·7	·7	1694·2	8·98	·37 „ „	18-11-'78
·58	·42	·7	·7	1695·9	·99	·38 „ „	18- „ „
·60	·44	·7	·7	1699·3	9·00	·40 „ „	19- „ „
·88	·91	169·8	190·7	1774·5	·30	·68 „ „	20-12- „
·91	·94	·8	·8	1779·6	·33	·71 „ „	19- „ „
·93	·96	·8	·8	1783·0	·34	·73 „ „	19- „ „
·95	·98	8	·9	1786·4	·36	·75 „ „	18- „ „
10·04	11·07	171·0	192·2	1800·9	·37	·08 „ 4th	14- „ „

Digitized by Google

TABLE VI.

HYDRAULIC ELEMENTS.

Soláni Right Aqueduct.

For Cross-Section, see Plate II., Fig. 4, and (on large scale), Plate I., Fig. 3.

Argument.—h = Depth at Gauge.
H = Central Depth, b = Surface-breadth, B = Wet Border, A = Area, R = Hydraulic Mean Depth.

h = H	b	B	A	R	Remarks.	h = H	b	B	A	R	Remarks.
·70	84·34	85·04	58·72	·69		6·60	85·00	96·95	559·93	5·78	
1·92	85·00	87·59	162·13	1·85		·70	·00	97·15	568·43	·85	
2·00	,,	·75	168·93	·93	Top of curve.	·80	·00	·35	576·93	·93	
·02	,,	·79	170·63	·95		·90	·00	·55	585·43	6·00	
·60	,,	88·95	219·93	2·47		7·00	·00	·75	593·93	·08	
·66	,,	89·07	225·03	·53		·10	·00	·95	602·43	·15	
·71	,,	·17	229·28	·57		·20	·00	98·15	610·93	·22	
·88	,,	·51	243·73	·72		·29	·00	·33	618·58	·29	Offset.
3·00	,,	·75	253·93	·83		·30	84·50	·35	619·43	·27	
·13	,,	90·01	264·98	·94		·40	·50	99·05	627·88	·34	
·18	,,	·11	269·23	·99		·50	·49	·25	636·33	·41	
·58	,,	·91	303·23	3·33		·60	·48	·45	644·78	·48	
·60	,,	·95	304·93	·35		·70	·46	·65	653·23	·56	
·95	,,	91·65	334·68	·65		·80	·44	·85	661·67	·63	
·99	,,	·73	338·08	·68		·90	·41	100·05	670·11	·70	
4·00	,,	·75	338·93	·69		8·00	·38	·25	678·55	·77	
·10	,,	·95	347·43	·78		·10	·34	·45	686·99	·84	
·20	,,	92·15	355·93	·86		·20	·30	·65	695·42	·91	
·30	,,	·35	364·43	·95		·30	·24	·87	703·85	·98	
·40	,,	·55	372·93	4·03		·40	·18	101·09	712·27	7·05	
·50	,,	·75	381·43	·11		·50	·12	·31	720·68	·11	
·60	,,	·95	389·93	·20		·60	·04	·53	729·09	·18	
·70	,,	93·15	398·43	·28		·70	83·96	·75	737·49	·25	
·80	,,	·35	406·93	·36		·80	·86	·99	745·88	·31	
·90	,,	·55	415·43	·44		·90	·74	102·25	754·26	·38	
5·00	,,	·75	423·93	·52		9·00	·61	·52	762·63	·44	
·10	,,	·95	432·43	·60		·10	·45	·81	770·98	·50	
·20	,,	94·15	440·93	·68		·20	·25	103·13	779·32	·56	
·30	,,	·35	449·43	·76		·30	82·97	·53	787·63	·61	
·40	,,	·55	457·93	·84		·37	·48	104·12	793·43	·62	Quadrant Head.
·50	,,	·75	466·43	·92		·40	·48	·18	795·90	·64	
·60	,,	·95	474·93	5·00		·50	·48	·38	804·15	·70	
·70	,,	95·15	483·43	·08		·60	·48	·58	812·40	·77	
·80	,,	·35	491·93	·16		·70	·48	·78	820·65	·83	
·90	,,	·55	500·43	·24		·80	·48	·98	828·90	·90	
6·00	,,	·75	508·93	·32		·84	·48	105·06	832·20	·92	
·10	,,	·95	517·43	·39		·85	·00	·56	833·02	·89	Offset.
·20	,,	96·15	525·93	·47		·90	·00	·66	837·12	·92	
·30	,,	·35	534·43	·55		10·00	·00	·86	845·32	·99	
·40	,,	·55	542·93	·62		·10	·00	106·06	853·52	8·05	
·50	,,	·75	551·43	·70							

Digitized by Google

TABLES VII.—XXVIII.

Subsurface and Mean Velocities past a Vertical.

Central Vertical.

Solání Left Aqueduct Site, ...	Series 1 to 4,	Tables	VII., VIII.
Solání Right Aqueduct Site, ...	Series 5 to 17,	,,	IX. to XIV.
Solání Right Aqueduct Site, with Left Aqueduct closed, ...	Series 18 to 20,	,,	XV.
Solání Embankment Main Site,	Series 21 to 28,	,,	XVI. to XIX.

Non-Central Verticals.

Solání Right Aqueduct Site,	Series 29 to 40,	Tables	XX. to XXV.
Solání Embankment Main Site,	Series 42 to 46,	,,	XXVI., XXVII.
	Series 41,	,,	XXVIII.

In these Tables each line shows a Set of various data collected *nearly at one time*. Such Sets of similar work as were done at nearly the same water-level and do not differ greatly in the velocities are grouped together into one Series.

In any one Series, the Sets done in one day follow *usually in the order of execution;* the work of different days is arranged generally by order of depth of water.

The Series are numbered from 1 to 46: those done upon the same vertical at the same Site following each other (by number) by order of depth of water.

The last four lines (marked δ, v, v', Δ) of each Series contain the following quantities for each Column, *viz.*—

δ, "Range" of (*i.e.*, difference between the greatest and least of) the quantities in the column.
v, Mean of the quantities in the column.
v', Value obtained from the velocity-parabola corresponding to the preceding quantity (v).
Δ, Discrepancy between the last two quantities.

Explanation of the Columns.

Col.	Symbol.	Detail.
2	h	Average height of water-surface above datum.
	H	Actual depth of water on the vertical of experiment.
	l	Variation of water-level during the experiment.
		Length of Rod used for finding Rod-velocity (u).
3	F_1	Fall of water-surface in upper part of the Reach.
	F_2	Fall of water-surface in middle part of the Reach.
	F_3	Fall of water-surface in lower part of the Reach.
	S	Local Surface-Slope, (3 decimals, *i. e.*, ·000, to be prefixed by reader).
4		Direction (referred to the current-axis as N. S. line), and Velocity (in feet per second) of the Wind, at beginning and end of each Set.
5		Initials of the Timekeeper.
6	v_x	Velocities at surface ($x = 0$), and at every foot of depth ($x = 1', 2', 3'$, &c.) below the surface, each entry being the mean of 3 observations at the nominal depths indicated by the length of the Connector (x).
	v_H	Bed-velocity computed from the above.
7	D	Discharge past the vertical (in sq. ft. per sec.), computed from the velocity-data of Col. 6.
8		*Three approximations to Mean Velocity past the vertical.*
	U	Quotient of Discharge ÷ Depth, *i. e.*, (D ÷ H), from Col. 7.
	$v_{\frac{1}{10}H}$	Mid-depth velocity computed from the data in Col. 6.
	u	Rod-velocity, the mean of 6 trials.
9		Values of the differences $(v_{\frac{1}{10}H} - U)$, $(u - U)$ between the approx. mean velocities in Col. 8.

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Left Aqueduct—

[*Instruments—3″ Double-Floats,*

Serial No.	Date, 1875.	1	2			3			4				5	SUBSURFACE- past the cen- [Each Velocity is the Nominal			
			Depth.			Fall of Water-Surface.			Wind. From		Wind. To						
			Actual.	Variation.	Length of Rod.	Upper 5 miles.	Lower 4½ miles.	Local Slope.	Direction.	Velocity.	Direction.	Velocity.	Timekeeper's Initial.	0	1	2	3
			H		l	F_1	F_2	S									
Series 1.	5-4-'75		9·50	·00	9	5·65	5·40	Not observed.	..	0	..	0	R	4·33	4·29	4·41	4·05
	„ „		·50	·00	9	„	„		W	7	SW	9	W	4·10	4·22	4·41	4·32
	6-4- „		·50	·00	9	5·65	5·35		..	0	..	0	R	4·26	4·11	4·05	4·29
	„ „		·50	·00	9	„	„		..	0	..	0	W	4·32	4·17	4·29	4·14
	„ „		·50	·00	9	„	„		..	0	..	0	R	4·36	4·17	4·29	4·11
	7-4- „		·50	·00	9	5·65	5·35		..	0	..	0	W	4·28	4·26	4·11	4·11
	„ „		·50	·00	9	„	„		..	0	..	0	R	4·19	4·00	4·17	4·00
	„ „		·50	·00	9	„	„		..	0	..	0	W	4·19	4·41	4·32	4·32
	8-4- „		·50	·00	9	5·65	5·35		..	0	SW	7	R	4·30	4·22	4·11	4·22
	„ „		·50	·00	9	„	„		SW	7	SW	30	W	4·18	4·20	4·44	4·44
	9-4- „		·50	·00	9	5·65	5·35		..	0	..	0	R	4·23	4·11	4·41	4·35
	„ „		·50	·00	9	„	„		..	0	..	0	W	4·33	4·38	4·03	4·20
	10-4- „		·50	·00	9	5·60	5·35		..	0	..	0	R	4·32	4·17	4·11	4·22
	„ „		·50	·00	9	„	„		..	0	..	0	W	4·32	4·35	4·41	4·22
	12-4- „		·40	·00	9	5·70	5·20		..	0	..	0	R	4·08	4·41	4·11	4·29
	„ „		·40	·00	9	„	„		..	0	..	0	W	4·17	4·26	4·11	4·05
	14-4- „		·40	·00	9	5·75	5·20		..	0	..	0	R	4·18	4·17	3·95	4·29
	„ „		·40	·00	9	„	„		..	0	W	4	W	4·29	4·32	4·20	4·03
	15-4- „		·25	·00	9	5·70	5·10		..	0	..	0	R	4·28	4·05	4·35	4·17
	„ „		·25	·00	9	„	„		..	0	..	0	W	4·25	4·44	4·17	4·44
δ	Range,		·25	..	0	·15	·30	..	..	..	..	..	..	·28	·44	·49	·44
v	Means of 20,		9·46	..	9	5·67	5·30	..	SW δ W 2				..	4·25	4·24	4·22	4·21
v′			Parabolic, (v′)			..	..		..	..	..	..	..	4·25	4·25	4·23	4·18
Δ			Discrepancies, (v − v′)			..	..		..	..	..	..	..	·00	−·01	−·01	+·03

Series 2, 3, see

Series 4.	18-2-'75		5·95	·00	5	5·85	2·55	Not observed.	s	8	s	15	W	3·45	3·49	3·45	3·29
	„ „		·93	−·05	5	5·87	2·53		s	15	s	16	R	3·45	3·49	3·45	3·49
	„ „		·90	·00	5	5·90	2·50		s	16	s	20	W	3·45	3·49	3·57	3·37
	„ „		·90	·00	5	„	„		s	15	s	15	R	3·52	3·70	3·66	3·40
δ	Range,		·05	..	0	·05	·05	..	..	..	..	..	..	·07	·21	·21	·20
v	Means of 4,		5·92	..	5	5·88	2·52	..	S 15				..	3·47	3·54	3·53	3·39
v′			Parabolic, (v′)			..	..		..	..	..	..	..	3·48	3·53	3·50	3·41
Δ			Discrepancies, (v − v′)			..	..		..	..	..	..	..	−·01	+·01	+·03	−·02

Digitized by Google

CITIES PAST A VERTICAL. **TABLE VII.**

CENTRAL VERTICAL.

and 1″ wood Rods].

6								7	8			9	
VELOCITIES tral vertical. mean of three observations]. Depths (z).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
									Discharge. Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials		
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	u	$(v_{\frac{1}{2}H} - U)$	$(u - U)$.
4·17	4·29	3·80	3·75	3·85	3·75	..	3·70	38·6	4·07	4·26	3·95	+·19	−·12
4·20	3·97	3·95	3·59	3·45	3·39	..	3·36	37·5	3·95	4·03	3·74	+·08	−·21
4·05	4·11	3·90	3·75	3·80	3·66	..	3·59	37·8	3·98	4·10	3·85	+·12	−·13
4·14	3·97	4·03	3·73	3·49	3·66	..	3·75	37·7	3·97	4·01	3·73	+·04	−·24
4·05	4·17	3·70	3·80	3·61	3·53	..	3·49	37·7	3·97	4·14	3·83	+·17	−·14
4·03	3·80	3·95	3·77	3·73	3·33	..	3·13	37·2	3·91	3·86	3·81	−·05	−·10
4·00	4·05	3·95	4·11	3·66	3·61	..	3·58	37·7	3·97	4·04	3·92	+·07	−·05
4·00	3·87	4·00	3·66	3·95	3·57	..	3·38	38·1	4·01	3·90	3·74	−·11	−·27
4·35	3·90	3·95	3·95	3·75	3·33	..	3·12	37·9	3·99	4·01	3·91	+·02	−·09
4·32	4·05	4·00	3·75	3·90	3·51	..	3·31	38·7	4·07	4·12	3·40	+·05	−·67
4·22	3·95	3·80	3·66	3·41	3·57	..	3·65	37·6	3·96	4·02	3·59	+·06	−·37
4·00	4·03	4·14	3·87	3·73	3·64	..	3·59	38·1	4·01	4·02	3·77	+·01	−·24
3·95	4·00	3·75	4·00	3·61	3·41	..	3·31	37·4	3·93	3·99	3·73	+·06	−·20
4·29	4·17	3·70	3·80	3·66	3·75	..	3·80	38·6	4·07	4·20	3·68	+·13	−·39
4·22	3·90	3·85	3·80	3·57	3·26	..	3·14	37·2	3·95	4·00	3·75	+·05	−·20
4·17	3·97	4·05	3·80	3·61	3·64	..	3·65	37·4	3·98	4·03	3·70	+·05	−·28
4·29	4·22	4·00	4·00	3·85	3·80	..	3·78	38·3	3·97	4·24	3·87	+·27	−·10
3·90	3·97	3·90	3·83	3·68	3·59	..	3·55	37·2	3·96	3·95	3·83	−·01	−·13
4·17	3·90	3·95	4·05	3·49	3·66	..	3·70	37·0	4·00	4·00	3·85	·00	−·15
4·20	3·83	3·95	3·85	3·64	3·66	..	3·67	37·3	4·04	3·97	3·87	−·07	−·17
·45	·49	·44	·52	·54	·54	..	·68	1·7	·16	·40	·55	·38	·62
4·14	4·01	3·92	3·82	3·67	3·57	..	3·51	37·8	3·99	4·04	3·77	+·05	−·22
4·12	4·04	3·94	3·82	3·68	3·52	..	3·44	37·8	3·99	4·06	..	+·07	..
+·02	−·03	−·02	+·01	−·01	+·05	..	+·07	·0	·00	−·02	..	−·02	..

NEXT PAGE.

3·26	3·22	..	..	..	..	..	3·18	19·9	3·34	3·29	3·40	−·05	+·06
3·19	3·09	..	..	..	..	..	3·00	19·8	3·33	3·49	3·45	+·16	+·12
3·12	2·97	..	..	..	..	..	2·83	19·4	3·26	3·38	3·12	+·12	−·14
3·09	3·09	..	..	..	..	..	3·09	20·0	3·36	3·41	3·29	+·05	−·07
·17	·25	..	..	..	..	..	·35	·6	·10	·20	·33	·21	·20
3·16	3·09	..	..	..	..	..	3·08	19·8	3·32	3·39	3·32	+·07	·00
3·24	3·00	..	..	..	..	..	2·71	19·6	3·31	3·41	..	·10	..
−·08	+·09	..	..	..	..	..	+·32	+·2	+·01	−·02	..	−·03	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Left Aqueduct—

[*Instruments*—3″ *Double-Floats*,

Serial No.	1 Date, 1875.	2 Depth. Actual. H	2 Depth. Variation.	2 Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	3 Fall of Water-Surface. Lower 4½ miles. F_2	3 Fall of Water-Surface. Local Slope. s	4 Wind. From. Direction.	4 Wind. From. Velocity.	4 Wind. To. Direction.	4 Wind. To. Velocity.	5 Timekeeper's Initial.	Subsurface past the centre. [Each Velocity is the Nominal. 0	1	2	3
Series 2.	27-1-'75	9·00	·00		5·70	4·90		*	0	*	0	W	4·17	4·22	4·29	4·22
	„ „	·00	·00		„	„		..	0	..	0	R	4·29	4·22	4·35	4·22
	„ „	·00	·00		„	„		..	0	..	0	R	4·41	4·29	4·48	4·48
	„ „	·00	·00		„	„		..	0	SW	12	W	4·17	4·48	4·35	4·55
	„ „	·00	·00		„	„		SW	12	?	?	W	4·17	4·48	4·29	4·17
	„ „	·00	·00		„	„		?	?	SW	11	R	4·17	4·11	4·29	4·17
	28-1- „	8·95	·00		5·70	4·85		..	0	?	?	W	4·29	4·29	4·35	4·29
	„ „	·95	·00		„	„		?	?	NE	4	R	4·41	4·55	4·41	4·22
	„ „	·95	·00		5·75	„		NE	4	?	?	W	4·69	4·55	4·41	4·17
	„ „	·95	·00		„	„		?	?	NE	4	R	4·48	4·41	4·35	4·29
	„ „	·95	·00		„	„		NE	4	?	?	W	4·48	4·29	4·29	4·35
	„ „	·95	·00		„	„		?	?	SE	8	R	4·48	4·22	4·55	4·48
	„ „	·95	·00		„	„		S	3	?	?	W	4·17	4·48	4·35	4·35
	„ „	·95	·00		„	„		?	?	..	0	R	4·29	4·17	4·29	4·05
	29-1- „	·95	·00		5·70	4·85		..	0	?	?	W	4·35	4·48	4·48	4·35
	„ „	·95	·00		„	„		?	?	E	10	R	4·48	4·11	4·35	4·35
	„ „	·95	·00		„	„		E	10	?	?	W	4·29	4·35	4·41	4·35
	„ „	·95	·00		„	„		?	?	..	0	R	4·55	4·29	4·11	4·41
	„ „	·95	·00		„	„		..	0	?	?	W	4·35	4·48	4·29	4·22
	„ „	·95	·00		„	„		?	?	NE	6	R	4·11	4·29	4·35	4·55
	„ „	·95	·00		„	„		NE	6	?	?	W	4·35	4·48	4·29	4·35
	„ „	·95	·00		„	„		?	?	..	0	R	4·29	4·11	4·35	4·22
δ	Range,	·05	..	..	·05	·05	..	..	..	..	..	..	·58	·44	·44	·50
v	Means of 22,	8·96	..	..	5·71	4·86	..	* SE *b* E 1				..	4·34	4·33	4·35	4·31
v′		Parabolic, (v′)						..	..	..			4·33	4·35	4·35	4·31
Δ		Discrepancies, (v − v′)						..	..	..			+·01	−·02	·00	·00
Series 3.	19-2-'75	7·25	·00	6	5·85	3·85		..	0	..	0	W	3·85	3·95	4·00	3·80
	„ „	·25	·00	6	„	„		..	0	S	8	R	3·90	3·80	3·95	3·61
	„ „	·25	·00	6	„	„		S	8	S	6	W	3·70	3·75	3·85	3·66
	„ „	·25	·00	6	„	„		S	6	S	7	R	3·66	4·00	4·05	3·85
	„ „	·25	·00	6	„	„		S	7	..	0	W	3·80	3·90	3·90	3·70
	„ „	·25	·00	6	„	„		..	0	S	9	R	3·70	3·80	3·75	3·95
	20-2- „	·25	·00	6	5·85	3·80		..	0	..	0	W	4·00	3·85	3·80	3·80
	„ „	·25	·00	6	„	„		..	0	S	5	R	3·85	3·95	3·95	3·75
	„ „	·25	·00	6	„	„		S	5	..	0	W	3·75	3·85	3·90	3·70
	„ „	·25	·00	6	„	„		..	0	..	0	R	3·90	4·00	3·85	3·80
	„ „	·25	·00	6	„	„		..	0	S	7	W	3·80	3·80	3·80	3·66
	„ „	·25	·00	6	„	„		..	0	..	0	R	3·90	3·90	3·90	3·70
δ	Range,	·00	..	0	·00	·05	..	..	..	..	..	..	·34	·25	·30	·34
v	Means of 12,	7·25	..	6	5·85	3·83	..	S 3				..	3·82	3·88	3·89	3·75
v′		Parabolic, (v′)						..	..	..			3·84	3·86	3·84	3·77
Δ		Discrepancies, (v − v′)						..	..	..			−·02	+·02	+·05	−·02

Not observed. (Series 2) / No Rods used. (Series 2) / Not observed. (Series 3)

Digitized by Google

CITIES PAST A VERTICAL. TABLE VIII.

CENTRAL VERTICAL.

and 1" wood Rods].

6								7	8			9	
VELOCITIES tral vertical. mean of three observations]. Depths (z).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations. Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials	DIFFERENCES	
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	u	$(v_{\frac{1}{2}H} - U)$.	$(u - U)$.
4·17	4·11	4·05	3·90	3·75	..	..	3·60	36·6	4·07	4·14		+·07	..
4·11	4·11	4·05	4·05	3·95	..	..	3·85	37·1	4·12	4·11		−·01	..
4·41	3·95	4·11	3·85	3·66	..	..	3·47	36·5	4·06	4·18		+·12	..
4·22	4·11	4·05	3·70	3·66	..	..	3·62	35·9	3·99	4·16		+·17	..
4·22	4·05	3·90	3·85	3·61	..	..	3·37	36·9	4·10	4·13		+·03	..
4·35	3·90	3·90	3·77	3·70	..	..	3·63	37·2	4·13	4·12		−·01	..
4·05	4·22	4·17	3·80	3·61	..	..	3·43	36·5	4·08	4·13		+·05	..
4·35	4·11	4·17	3·75	3·75	..	..	3·75	37·1	4·14	4·23		+·09	..
4·29	4·17	4·11	3·90	3·75	..	..	3·61	37·2	4·16	4·23		+·07	..
4·29	4·17	4·00	3·90	3·80	..	..	3·70	37·1	4·15	4·23		+·08	..
4·22	4·05	4·05	3·95	3·70	..	..	3·46	36·7	4·10	4·14		+·04	..
4·35	4·35	4·17	3·85	3·66	..	..	3·48	37·4	4·17	4·35		+·18	..
4·22	4·35	4·11	3·90	3·66	..	..	3·43	37·2	4·16	4·28		+·12	..
4·22	4·25	4·17	3·85	3·61	..	..	3·38	36·2	4·04	4·23		+·19	..
4·29	4·17	4·05	3·85	3·75	..	..	3·65	37·2	4·16	4·23		+·07	..
4·48	4·22	4·05	3·90	3·80	..	..	3·70	37·0	4·14	4·36		+·22	..
4·29	4·11	3·95	3·85	3·57	..	..	3·30	36·5	4·08	4·20		+·12	..
4·29	4·17	3·95	3·75	3·66	..	..	3·57	36·6	4·09	4·23		+·14	..
4·11	4·29	4·17	4·05	3·75	..	..	3·46	37·2	4·16	4·20		+·04	..
4·17	4·05	4·22	3·80	3·80	..	..	3·80	37·0	4·13	4·11		−·02	..
4·41	4·29	3·85	4·05	3·85	..	..	3·66	37·6	4·20	4·35		+·15	..
4·22	4·11	4·08	3·66	3·66	..	..	3·66	36·0	4·03	4·17		+·14	..
·43	·45	·37	·39	·38	..	..	·55	1·7	·21	·25	..	·24	..
4·26	4·15	4·06	3·86	3·71	..	..	3·57	36·9	4·11	4·21	..	+·10	..
4·25	4·16	4·04	3·89	3·71	..	..	3·52	36·8	4·11	4·21	..	+·10	..
+·01	−·01	+·02	−·03	·00	..	..	+·05	+·1	·00	·00	..	·00	..
3·61	3·37	3·40	Not observed.				3·44	26·6	3·66	3·68	3·57	+·02	−·09
3·66	3·45	3·49					3·54	26·3	3·62	3·64	3·45	+·02	−·17
3·53	3·33	3·26					3·17	25·5	3·52	3·58	3·45	+·06	−·07
3·53	3·29	3·33					3·38	26·4	3·65	3·65	3·66	·00	+·01
3·61	3·40	3·19					2·93	25·8	3·56	3·64	3·63	+·08	+·07
3·53	3·61	3·33					2·98	26·5	3·65	3·61	3·70	−·04	+·05
3·57	3·66	3·45					3·19	26·7	3·68	3·66	3·50	−·02	−·18
3·57	3·37	3·37					3·37	26·4	3·64	3·64	3·63	·00	−·01
3·85	3·57	3·49					3·39	26·6	3·67	3·79	3·77	+·12	+·10
3·66	3·66	3·49					3·28	27·0	3·73	3·71	3·38	−·02	−·35
3·49	3·33	3·45					3·60	26·1	3·59	3·55	3·57	−·04	−·02
3·61	3·66	3·37					3·01	26·4	3·64	3·64	3·45	·00	−·19
·36	·37	·30	..	..	..	..	·67	1·5	·21	·24	·39	·16	·45
3·60	3·47	3·38	..	..	..	..	3·27	26·4	3·63	3·65	3·56	+·02	−·07
3·66	3·49	3·28	..	..	..	..	2·95	26·1	3·60	3·71	..	+·11	..
−·06	−·02	+·10	..	..	..	..	+·32	+·3	+·03	−·06	..	−·09	..

* Wind observed only at beginning and end of alternate Sets in this Series.

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Right Aqueduct—

[*Instruments*—1⅝″ *Double-Floats,*

Serial No.	1 Date, 1876-77-78.	2 Depth. Actual. H	2 Depth. Variation.	2 Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	3 Fall of Water-Surface. Lower 4¼ miles. F_2	3 Fall of Water-Surface. Local Slope. S	4 Wind. From Direction.	4 Wind. From Velocity.	4 Wind. To Direction.	4 Wind. To Velocity.	5 Timekeeper's Initial.	Subsurface past the centre. (Each Velocity is the Nominal) 0	1	2	3
Series 5.	18-8-'77	9·97	+ ·02	9½	5·98	5·50	?	NE	3	SW	*l*	P	4·76	4·55	4·80	4·69
	" "	·99	+ ·02	9½	5·96	5·52	?	SW	*l*	SW	*l*	W	4·69	4·65	4·72	4·76
	17-8- "	·97	+ ·03	9½	5·98	5·50	?	W	4	ENE	5	P	4·88	4·48	4·76	4·76
	" "	·98	·00	9½	5·97	5·51	?	ENE	5	NNE	7	W	4·58	4·76	4·84	4·65
	17-6-'78	·97	+ ·03	9½	5·98	5·52	200	W	4	..	0	P	4·35	4·61	4·76	4·69
	19-6- "	·96	·00	9½	5·99	5·51	198	N	9	..	0	R	4·20	4·76	4·65	4·69
	25-6- "	·95	+ ·02	9½	6·00	5·45	200	S	*l*	W	8	R	4·69	4·61	4·76	4·76
	" "	·97	+ ·02	9½	5·98	5·47	"	W	8	S	*l*	P	4·65	4·61	4·69	4·92
	1-7- "	·96	·00	9½	5·99	5·41	203	E	4	..	0	P	4·61	4·44	4·72	4·72
	" "	·96	·00	9½	"	"	"	..	0	E	15	R	4·05	4·84	4·61	4·72
	22-6- "	·95	·00	9½	6·00	5·50	205	S	4	S	12	P	4·48	4·84	4·92	4·92
	27-6- "	·95	+ ·01	9½	6·00	5·43	207	V	*l*	SSE	8	R	4·84	4·69	4·80	4·76
	4-7- "	·92	·00	9½	6·03	5·35	208	NE	7	NE	12	P	4·08	4·72	4·55	4·92
	16-8-'77	·87	− ·01	9½	5·93	5·40	?	NE	4	ENE	5	P	4·76	4·72	5·04	5·00
	" "	·86	− ·01	9½	5·94	5·39	?	ENE	5	ENE	6	W	4·80	4·76	4·72	4·76
	15-8- "	·77	− ·06	9½	5·93	5·37	?	NNE	8	..	0	W	4·80	4·72	4·69	4·58
δ	Range,	·22	..	0	·10	·17	?	..	..	..	..	..	·83	·40	·49	·42
v	Means of 16,	9·94	..	9·5	5·98	5·45	?	NE *b* E 2				..	4·58	4·67	4·75	4·77
v'		Parabolic, (*v'*) ..			..	..		..	..	..	..	..	4·61	4·67	4·71	4·72
Δ		Discrepancies, (*v* − *v'*) ..			..	..		..	..	..	..	..	− ·03	·00	+ ·04	+ ·05
Series 6.	28-4-'77	9·48	·00	9	5·82	5·28	179	..	0	N	8	P	4·20	4·55	4·44	4·51
	" "	·48	·00	9	"	"	"	N	8	V	10	W	4·72	4·41	4·17	4·44
	30-4- "	·48	·00	9	5·82	5·28	?	N	6	N	5	P	4·11	4·48	4·29	4·32
	" "	·48	·00	9	"	"	?	N	5	N	5	W	4·48	4·35	4·35	4·58
	" "	·48	·00	9	"	"	?	S	5	N	25	P	3·95	4·22	4·51	4·44
	30-5-'76	·45	·00	9	5·90	5·35	?	E	9	NE	10	W	4·51	4·38	4·55	4·26
	" "	·45	·00	9	"	"	?	NE	12	E	20	H	4·48	4·32	4·41	4·51
	9-5- "	·44	+ ·02	9	5·81	5·34	?	SE	11	NE	10	W	4·35	4·55	4·38	4·32
	" "	·45	·00	9	5·80	5·35	?	NE	8	E	19	H	4·00	4·41	4·38	4·17
	10-5- "	·43	·00	9	5·82	5·33	?	..	0	..	0	W	4·26	4·38	4·35	4·41
	" "	·43	·00	9	"	"	?	..	0	NE	15	H	4·38	4·44	4·26	4·20
	9-5-'78	·33	·00	8½	5·87	5·08	190	V	*l*	V	*l*	R	4·00	4·38	4·41	4·35
	7-5- "	·33	·00	9	5·87	5·06	180	..	0	S	5	R	3·85	4·20	4·35	4·55
	" "	·32	− ·03	9	5·88	5·05	"	S	5	..	0	P	4·20	4·32	4·48	4·48
	8-5- "	·27	·00	8½	5·83	5·02	188	..	0	S	8	R	4·22	4·17	4·32	4·41
	" "	·27	·00	8½	"	"	"	S	8	..	0	P	4·00	4·20	4·38	4·41
δ	Range,	·21	..	·5	·10	·33	?	..	..	..	..	..	·87	·38	·38	·41
v	Means of 16,	9·41	..	8·9	5·84	5·23	?	NE *b* E 4				..	4·23	4·36	4·38	4·40
v'		Parabolic, (*v'*) ..			..	..		..	..	..	..	..	4·27	4·33	4·36	4·37
Δ		Discrepancies, (*v* − *v'*) ..			..	..		..	..	..	..	..	− ·04	+ ·03	+ ·02	+ ·03

Digitized by Google

CITIES PAST A VERTICAL.

TABLE IX.

CENTRAL VERTICAL.

and 1" tin Tube-Rods].

6								7	8			9	
VELOCITIES tral vertical. mean of three observations]. Depths (z).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
									Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials		
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	s	$(v_{\frac{1}{2}H} - U)$.	$(s - U)$.
4·65	4·65	4·69	4·35	4·55	4·41	4·48	4·48	45·6	4·57	4·65	4·36	+·08	−·21
4·76	4·80	4·65	4·51	4·55	4·55	4·26	4·26	46·4	4·65	4·80	4·36	+·15	−·29
4·80	4·72	4·84	4·61	4·65	4·48	4·55	4·55	46·4	4·66	4·72	4·26	+·06	−·40
4·69	4·80	4·55	4·51	4·65	4·44	4·41	4·41	46·3	4·64	4·80	4·49	+·16	−·15
4·72	4·48	4·61	4·44	4·61	4·48	4·38	4·38	45·5	4·56	4·48	4·15	−·08	−·41
4·84	4·61	4·69	4·72	4·44	4·51	4·38	4·38	46·1	4·63	4·61	4·38	−·02	−·25
4·61	4·72	4·80	4·51	4·58	4·51	4·29	4·29	46·1	4·63	4·72	4·48	+·09	−·15
4·51	4·48	4·76	4·61	4·38	4·55	4·55	4·55	46·1	4·62	4·48	4·17	−·14	−·45
4·65	4·48	4·38	4·44	4·35	4·32	4·55	4·55	44·8	4·50	4·48	4·26	−·02	−·24
4·76	4·51	4·76	4·69	4·55	4·55	4·61	4·61	46·2	4·64	4·51	4·21	−·13	−·43
4·48	4·38	4·51	4·72	4·38	4·32	4·17	4·17	45·8	4·60	4·38	4·32	−·22	−·28
4·65	4·55	4·51	4·48	4·51	4·55	4·29	4·29	45·8	4·61	4·55	4·48	−·06	−·13
4·69	4·80	4·84	4·65	4·51	4·58	4·65	4·65	46·5	4·69	4·80	4·15	+·11	−·54
4·72	4·58	4·48	4·55	4·38	4·29	4·61	4·61	45·8	4·64	4·59	4·12	−·05	−·52
4·84	4·72	4·58	4·38	4·22	4·26	4·29	4·29	45·1	4·58	4·73	4·36	+·15	−·22
4·69	4·55	4·61	4·55	4·38	4·38	4·22	4·22	45·0	4·60	4·57	4·36	−·03	−·24
·36	·42	·46	·37	·43	·32	·48	·48	1·7	·19	·42	·37	·38	·41
4·69	4·61	4·64	4·55	4·48	4·45	4·42	4·42	45·8	4·61	4·62	4·31	+·01	−·30
4·72	4·69	4·64	4·56	4·47	4·35	4·22	4·22	45·7	4·60	4·69	..	+·09	..
−·03	−·08	·00	−·01	+·01	+·10	+·20	+·20	+·1	+·01	−·07	..	−·08	..
4·32	4·38	4·26	4·29	4·03	4·17	..	4·24	41·0	4·32	4·36	3·86	+·04	−·46
4·55	4·14	4·35	4·05	4·00	4·14	..	4·21	40·4	4·26	4·25	4·20	−·01	−·06
4·32	4·38	3·90	4·20	3·90	4·05	..	4·12	40·0	4·21	4·36	4·10	+·15	−·11
4·26	4·17	4·26	4·14	4·08	4·05	..	4·04	40·3	4·25	4·19	3·92	−·06	−·33
4·32	4·20	4·29	4·22	4·29	4·22	..	4·19	40·6	4·28	4·23	4·17	−·05	−·11
4·38	4·32	4·20	4·14	4·22	4·14	..	4·10	40·7	4·30	4·34	4·12	+·04	−·18
4·51	4·44	4·22	4·29	4·08	4·35	..	4·47	41·2	4·35	4·46	4·17	+·11	−·18
4·32	4·29	4·35	4·11	4·38	4·17	..	4·08	40·8	4·32	4·30	4·20	−·02	−·12
4·35	4·44	4·22	4·17	4·05	4·22	..	4·30	40·3	4·27	4·42	4·21	+·15	−·06
4·22	4·14	4·08	3·97	3·87	4·14	..	4·26	39·4	4·17	4·16	3·97	−·01	−·20
4·26	4·14	4·35	4·26	3·95	4·03	..	4·06	39·8	4·22	4·17	4·03	−·05	−·19
4·48	4·44	4·17	4·22	4·22	4·35	..	4·39	40·4	4·33	4·45	4·12	+·12	−·21
4·55	4·29	4·26	4·26	4·17	4·14	..	4·13	40·0	4·29	4·38	4·11	+·09	−·18
4·35	4·58	4·38	4·08	4·17	4·17	..	4·17	40·3	4·33	4·50	3·87	+·17	−·46
4·26	4·35	4·14	4·05	4·00	3·97	..	3·96	38·9	4·19	4·32	3·93	+·13	−·26
4·38	4·17	4·44	4·11	4·11	4·03	..	4·01	39·3	4·24	4·25	4·33	+·01	+·09
·33	·44	·54	·32	·51	·38	..	·51	2·3	·18	·34	·47	·23	·55
4·36	4·30	4·24	4·16	4·10	4·15	..	4·17	40·2	4·27	4·32	4·08	+·05	−·19
4·36	4·33	4·28	4·20	4·10	3·98	..	3·92	40·1	4·26	4·34	..	+·08	..
·00	−·03	−·04	−·04	·00	+·17	..	+·25	+·1	+·01	−·02	..	−·03	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Right Aqueduct—

[*Instruments*—$1\frac{5}{8}$" *Double-Floats*,

Serial No.	1 Date, 1876.	2 Depth. Actual. H	Variation.	Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_3	Local Slope. S	4 Wind. From Direction.	Velocity.	To Direction.	Velocity.	5 Timekeeper's Initial.	Subsurface- past the cen- [Each Velocity is the Nominal 0	1	2	3
Series 7.	23-3-'76	8·95	·00	8	5·85	4·95	195	NE	6	..	0	W	4·17	4·20	4·38	4·22
	13-3- „	·90	·00	8	5·85	4·85	?	S	5	S ẟ W	10	H	4·51	3·77	4·20	4·29
	„ „	·90	·00	8	„	„	?	S ẟ W	10	S ẟ W	10	W	4·00	4·20	4·26	4·03
	15-3- „	·85	·00	8	5·75	4·85	?	SW	8	W	6	W	4·08	4·22	4·22	4·14
	„ „	·85	·00	8	„	„	?	W	6	S ẟ W	10	H	4·38	4·05	4·08	4·03
	„ „	·85	·00	8	„	„	?	S ẟ W	10	S	11	W	3·95	4·08	4·05	4·11
	„ „	·85	·00	8	5·85	„	?	S	11	S	5	H	3·90	4·17	4·20	4·35
	„ „	·85	·00	8	„	„	?	S	5	S	9	W	4·05	4·17	4·20	3·97
	„ „	·85	·00	8	„	„	?	S	9	SSW	15	H	3·64	4·11	4·00	4·26
	16-3- „	·85	·00	8	5·75	4·85	?	..	0	..	0	W	4·08	4·00	4·08	4·11
	„ „	·85	·00	8	„	„	?	..	0	..	0	H	4·22	3·90	4·08	4·05
	„ „	·85	·00	8	„	„	?	S	4	S	6	W	4·11	4·05	4·05	4·03
	„ „	·85	·00	8	„	„	?	S	6	S	12	H	4·29	4·29	4·17	4·03
	14-3- „	·80	·00	8	5·80	4·80	?	N	5	..	0	H	4·00	4·26	4·03	4·17
	„ „	·80	·00	8	„	„	?	..	0	..	0	W	4·17	4·22	4·35	4·38
	„ „	·85	·00	8	5·85	4·85	?	S	5	S	17	H	3·95	4·11	4·20	4·26
	18-3- „	·80	·00	8	5·80	4·90	?	..	?0	..	?0	W	3·97	4·00	4·08	4·05
	„ „	·80	·00	8	„	„	?	S	14	..	0	H	3·85	3·77	4·08	4·11
ẟ	Range,	·15	..	0	·10	·15	?	..	..	..	..	..	·87	·52	·38	·41
v	Means of 16,	8·85	..	8	5·80	4·86	?	S ẟ W 5				..	4·07	4·09	4·15	4·14
v′		Parabolic, (v′)			..	..	..	..	..	..	..	..	4·07	4·11	4·13	4·13
Δ		Discrepancies, (v − v′)			..	..	..	..	..	..	..	..	·00	−·02	+·02	+·01
Series 8.	22-4-'76	8·53	·00	8	5·82	4·73	200	..	0	..	0	H	4·03	4·08	4·05	4·03
	„ „	·53	·00	8	„	„	„	..	0	..	0	W	4·17	4·11	4·14	4·08
	„ „	·53	·00	8	„	„	„	..	0	..	0	H	4·03	3·97	4·20	4·14
	„ „	·53	·00	8	„	„	„	..	0	..	0	W	4·05	4·22	4·08	4·14
	„ „	·53	·00	8	„	„	„	..	0	..	0	H	3·92	4·11	4·26	4·17
	„ „	·53	·00	8	„	„	„	..	0	..	0	W	4·00	4·29	4·14	3·97
	21-4- „	·45	·00	8	5·85	4·65	200	..	0	..	0	H	3·87	4·05	4·08	4·08
	„ „	·45	·00	8	„	„	„	..	0	N ẟ E	11	W	4·08	4·11	4·11	4·17
	„ „	·45	·00	8	„	„	„	N ẟ E	11	NE	10	H	4·05	4·11	4·11	3·77
	„ „	·45	·00	8	„	„	„	NE	10	NE	14	W	3·97	4·11	3·90	4·00
	19-4- „	·30	·00	8	5·80	4·50	205	..	0	..	0	H	4·00	3·90	4·05	4·05
	„ „	·30	·00	8	„	„	„	..	0	..	0	W	3·92	4·17	4·29	3·90
	20-4- „	·30	·00	8	5·80	4·50	205	..	0	..	0	H	4·00	4·26	4·08	4·29
	„ „	·30	·00	8	„	„	„	..	0	..	0	W	4·00	4·08	4·11	4·03
	„ „	·30	·00	8	„	„	„	..	0	NNE	7	H	4·05	4·14	3·92	4·03
	„ „	·30	·00	8	„	„	„	NNE	7	V	15	W	4·29	4·32	3·95	4·20
ẟ	Range,	·23	..	0	·05	·23	005	..	..	..	..	..	·42	·42	·39	·52
v	Means of 16,	8·42	..	8	5·82	4·62	202	NE ẟ N 2				..	4·03	4·13	4·09	4·07
v′		Parabolic, (v′)			..	..	..	..	..	..	..	..	4·06	4·09	4·10	4·08
Δ		Discrepancies, (v−v′)			..	..	..	..	..	..	..	..	−·03	+·04	−·01	−·01

Digitized by Google

CITIES PAST A VERTICAL. TABLE X.

CENTRAL VERTICAL.

and 1" tin Tube-Rods].

6								7	8			9	
VELOCITIES tral vertical. mean of three observations).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
									Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials		
Depths (z).													
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	u	$(v_{\frac{1}{2}H} - U)$.	$(u - U)$.
4·38	4·05	4·11	3·80	3·73	..	..	3·66	36·5	4·07	4·22	4·00	+·15	−·07
4·17	4·05	3·95	3·97	3·82	..	..	3·68	35·8	4·02	4·12	3·91	+·10	−·11
4·17	4·08	4·05	3·85	3·87	..	..	3·89	36·0	4·04	4·13	3·96	+·09	−·08
4·17	4·05	4·08	3·97	3·73	..	..	3·53	35·9	4·05	4·12	3·93	+·07	−·12
4·05	3·95	3·95	3·92	3·75	..	..	3·61	35·2	3·97	4·01	3·7	+·04	−·26
4·20	4·03	3·82	3·75	3·61	..	..	3·49	34·9	3·94	4·13	3·79	+·19	−·15
4·35	4·20	3·82	3·87	3·96	..	..	3·93	36·3	4·11	4·29	3·82	+·18	−·29
4·00	4·11	3·85	3·90	3·77	..	..	3·66	35·3	3·99	4·05	3·76	+·06	−·23
3·95	4·08	3·95	3·85	3·70	..	..	3·57	35·2	3·98	4·01	3·88	+·03	−·10
4·05	3·85	4·05	3·70	3·68	..	..	3·66	34·7	3·92	3·96	3·86	+·04	−·06
4·11	3·82	3·85	4·05	3·77	..	..	3·53	34·9	3·94	3·99	3·76	+·05	−·18
3·95	3·85	3·85	3·82	3·70	..	..	3·60	34·6	3·91	3·91	3·87	·00	−·04
4·05	4·11	4·03	3·90	3·82	..	..	3·75	35·9	4·05	4·08	3·80	+·03	−·25
4·03	3·92	4·14	3·85	3·68	..	..	3·54	35·2	4·00	3·99	3·88	−·01	−·12
4·20	3·90	3·92	3·90	3·85	..	..	3·81	35·9	4·08	4·08	3·93	·00	−·15
3·95	4·22	4·00	4·03	3·75	..	..	3·51	35·9	4·06	4·07	3·85	+·01	−·21
4·11	4·11	4·00	3·73	3·66	..	..	3·60	34·8	3·95	4·11	3·87	+·16	−·08
3·97	3·92	3·92	3·85	3·59	..	..	3·38	34·1	3·88	3·95	3·75	+·07	−·13
·43	·40	·32	·35	·31	..	..	·55	2·4	·23	·38	·29	·20	·25
4·10	4·02	3·96	3·87	3·74	..	..	3·63	35·4	4·00	4·07	3·85	+·07	−·15
4·10	4·04	3·96	3·86	3·73	..	..	3·60	35·4	4·00	4·08	..	·08	..
·00	−·02	·00	+·01	+·01	..	..	+·03	·0	·00	−·01	..	−·01	..
3·90	3·87	3·85	3·82	3·66	..	..	3·58	33·4	3·92	3·89	3·81	−·03	−·11
4·08	3·90	3·75	3·47	3·82	..	..	4·01	33·5	3·92	4·03	3·71	+·11	−·21
4·29	3·85	3·82	3·92	3·68	..	..	3·55	33·9	3·97	4·17	3·73	+·20	−·24
4·22	3·92	4·08	3·77	3·75	..	..	3·74	34·2	4·01	4·14	3·76	+·13	−·25
4·03	4·11	3·95	3·97	3·85	..	..	3·79	34·6	4·05	4·05	3·70	·00	−·35
4·08	4·00	3·87	3·75	3·75	..	..	3·75	34·0	3·98	4·06	3·82	+·08	−·16
3·82	3·90	3·97	3·77	3·95	..	..	4·03	33·4	3·95	3·84	3·86	−·11	−·09
4·08	3·87	3·55	3·57	3·73	..	..	3·80	33·1	3·92	4·03	3·71	+·11	−·21
4·00	4·11	3·97	3·75	3·53	..	..	3·43	33·1	3·92	4·03	3·71	+·11	−·21
3·92	4·00	3·82	3·73	3·75	..	..	3·76	33·1	3·92	3·94	3·92	+·02	·00
4·03	3·97	3·87	3·70	3·64	..	..	3·62	32·4	3·91	4·02	3·71	+·11	−·20
3·80	3·85	3·49	3·64	3·47	..	..	3·42	32·0	3·85	3·81	3·82	−·04	−·03
4·26	3·95	3·68	3·75	3·70	..	..	3·68	33·4	4·02	4·21	3·85	+·19	−·17
4·11	4·03	3·85	3·80	3·77	..	..	3·76	33·0	3·98	4·10	3·79	+·12	−·19
3·97	4·03	4·03	3·73	3·64	..	..	3·61	32·8	3·96	3·98	3·79	+·02	−·17
4·03	3·95	3·70	3·68	3·51	..	..	3·46	33·0	3·97	4·02	3·70	+·05	−·27
·49	·26	·59	·50	·48	..	..	·61	2·6	·20	·40	·22	·31	·35
4·04	3·96	3·83	3·74	3·70	..	..	3·69	33·3	3·95	4·02	3·77	+·07	−·18
4·03	3·96	3·87	3·75	3·61	..	..	3·54	33·3	3·95	4·02	..	+·07	..
+·01	·00	−·04	−·01	+·09	..	..	+·15	·0	·00	·00	..	·00	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Right Aqueduct—

[*Instruments*—$1\frac{5}{8}$" *Double-Floats*,

Serial No.	1 Date, 1875—79.	2 Depth. Actual. H	2 Depth. Variation.	2 Length of Rod. l	3 Fall of Water-Surface. Upper 6 miles. F_1	3 Fall of Water-Surface. Lower 4½ miles. F_2	3 Fall of Water-Surface. Local Slope. S	4 Wind. From. Direction.	4 Wind. From. Velocity.	4 Wind. To. Direction.	4 Wind. To. Velocity.	5 Timekeeper's Initial.	Subsurface past the centre. [Each Velocity is the Nominal. 0	1	2	3
Series 9.	22-10-'78	8·21	−·02	7½	6·51	4·11	173	NNW	4	..	0	R	4·80	4·80	4·69	4·84
	5-4-'79	·28	·00	7½	5·82	4·11	208	..	0	..	0	Cl	4·17	4·41	4·17	4·35
	30-6-'76	·30	·00	8	5·90	4·60	?	..	0	..	0	H	4·29	4·08	4·05	4·14
	„ „	·30	·00	8	„	„	?	..	0	..	0	W	4·22	4·14	4·14	4·32
	„ „	·30	·00	8	„	„	?	..	0	..	0	H	4·17	4·26	4·22	4·35
	„ „	·30	·00	8	„	„	?	..	0	SW	6	W	4·22	4·20	4·26	3·97
	11-7- „	·27	·00	8	5·98	4·57	?	..	0	..	0	H	4·20	4·41	4·55	4·41
	„ „	·29	+·03	8	5·96	4·59	?	..	0	S	5	W	4·32	4·41	4·38	4·38
	„ „	·32	+·04	8	5·93	4·62	?	S	5	S	4	H	4·20	4·35	4·48	4·26
	„ „	·36	+·04	8	5·89	4·66	?	S	4	S	9	W	4·14	4·38	4·38	4·51
	„ „	·39	+·01	8	5·86	4·69	?	S	9	S	5	H	3·82	4·41	4·41	4·58
	„ „	·40	+·01	8	5·85	4·70	?	S	5	S	4	W	4·41	4·58	4·38	4·48
	„ „	·42	+·03	8	5·83	4·72	?	S	4	..	0	H	4·55	4·51	4·41	4·61
	23-10-'78	·40	·00	8	6·50	4·30	143	SW	*l*	..	0	P	4·44	4·69	4·65	4·72
δ	Range,	·21	..	·5	·69	·61	?	..	..	..	..	..	·98	·72	·64	·87
v	Means of 14,	8·32	..	7·9	5·98	4·53	?	S δ W 2				..	4·28	4·40	4·37	4·42
v'		Parabolic, (*v'*)						..	..	..	..	..	4·31	4·36	4·38	4·37
Δ		Discrepancies, (*v* − *v'*) ..						..	..	..	..	..	−·03	+·04	−·01	+·05
Series 10	17-7-'76	8·16	−·02	7	5·99	4·46	Not observed.	..	0	..	0	W	4·55	4·58	4·38	4·41
	„ „	·10	−·10	7	6·05	4·40		..	0	SE	4	H	4·38	4·76	4·35	4·35
δ	Range,	·06	..	0	·06	·06		..	..	..	..	..	·17	·18	·03	·06
v	Means of 2,	8·13	..	7	6·02	4·43		SE 1				..	4·47	4·67	4·37	4·38
Series 11.	29-6-'76	7·80	·00	7	5·90	4·25	?	SSW	6	W δ N	4	W	3·85	4·00	4·08	4·05
	„ „	·80	·00	7	„	„	?	W δ N	4	..	0	H	3·87	3·97	4·11	3·95
	„ „	·80	·00	7	„	„	?	..	0	..	0	W	4·17	4·11	3·97	4·11
	„ „	·80	·00	7	„	„	?	..	0	..	0	H	4·08	3·90	4·08	4·11
	„ „	·80	·00	7	„	„	?	..	0	W	6	W	4·05	3·87	4·17	4·03
	„ „	·80	·00	7	„	„	?	W	6	W	11	H	4·08	4·14	3·87	4·20
	„ „	·80	·00	7	„	„	?	W	11	W	10	W	3·87	4·29	4·03	4·26
	27-6- „	·79	−·02	7	5·81	4·29	210	..	0	..	0	W	3·95	4·29	4·14	4·17
	„ „	·77	−·02	7	5·83	4·27	„	..	0	..	0	H	4·20	4·22	4·14	4·32
	„ „	·76	·00	7	5·84	4·26	„	..	0	..	0	W	4·17	4·20	4·00	4·05
	28-6- „	·68	·00	7	5·82	4·18	215	..	0	..	0	H	4·22	4·29	4·08	4·14
	„ „	·68	·00	7	„	„	„	..	0	..	0	W	4·14	4·11	4·11	4·22
	„ „	·67	−·03	7	5·83	4·17	„	..	0	..	0	H	4·08	4·05	4·17	4·26
	„ „	·65	·00	7	5·85	4·15	„	..	0	..	0	W	4·05	4·03	4·08	4·05
	„ „	·64	−·03	7	5·86	4·14	„	..	0	..	0	H	3·95	4·08	4·03	4·17
δ	Range,	·16	..	0	·09	·15	?	..	..	..	..	..	·37	·42	·30	·37
v	Means of 15,	7·75	..	7	5·86	4·23	?	W 2				..	4·05	4·10	4·07	4·14
v'		Parabolic, (*v'*)						..	..	..	..	..	4·05	4·10	4·11	4·10
Δ		Discrepancies, (*v* − *v'*) ..						..	..	..	..	..	·00	·00	−·04	+·04

Digitized by Google

TABLE XI.

CITIES PAST A VERTICAL.

CENTRAL VERTICAL.

and 1" tin Tube-Rods].

6								7	8			9	
VELOCITIES tral vertical. mean of three observations). Depths (z).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations. Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials	DIFFERENCES	
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{4}H}$	u	$(v_{\frac{1}{4}H} - U)$.	$(u - U)$.
4·65	4·76	4·61	4·69	4·55	..	..	4·52	38·8	4·73	4·66	4·44	−·07	−·29
4·17	4·05	3.87	3·75	3·75	..	..	3·75	33·9	4·10	4·15	4·01	+·05	−·09
4·11	3·95	3·85	4·17	3·70	..	..	3·56	33·6	4·04	4·09	3·96	+·05	−·08
4·26	4·17	4·11	3·80	3·85	..	..	3·87	34·1	4·11	4·25	3·66	+·14	−·45
3·80	3·95	4·00	3 90	3·90	..	..	3·90	33·8	4·07	3·82	3·95	−·25	−·12
4·03	4·03	4·83	3·73	3·68	..	..	3·66	33·1	3·98	4·03	3·83	+·05	−·15
4·14	4·22	4·14	4·08	4·00	..	..	3·98	35·2	4·25	4·15	3·77	−·10	−·48
4·20	4·22	4·20	3·97	3·95	..	..	3·94	35·1	4·23	4·20	3·92	−·03	−·31
4·35	4·22	4·29	3·97	3·95	..	..	3·94	35·1	4·22	4·33	3·93	+·11	−·29
4·20	4·26	4·14	4·00	3·87	..	..	3·82	35·4	4·24	4·21	4·05	−·03	−·19
4·35	4·41	4·14	3·95	4·00	..	..	4·02	35·9	4·28	4·36	3·96	+·08	−·32
4·41	4·32	4·26	3·95	4·11	..	..	4·17	36·3	4·32	4·39	4·00	+·07	−·32
4·22	4·14	4·38	3·95	4·29	..	..	4·43	36·4	4·32	4·20	4·11	−·12	−·21
4·61	4·72	4·61	4·48	4·26	..	..	4·17	38·7	4·60	4·63	4·07	+·03	−·53
·85	·81	·98	·96	·87	..	..	·96	5·7	·75	·84	·78	·39	·45
4·25	4·24	4·25	4·03	3·99	..	..	3·98	35·4	4·32	4·25	3·98	−·07	−·34
4·33	4·27	4·19	4·07	3·93	..	..	3·88	35·4	4·25	4·33	..	+·08	..
−·08	−·03	+·06	−·04	+·06	..	..	+·10	·0	+·07	−·08	..	−·15	..
4·55	4·55	4·38	4·35	4·25	..	..	4·23	36·3	4·45	4·55	4·05	+·10	−·40
4·48	4·35	4·20	4·22	3·90	..	..	3·87	35·4	4·37	4·47	4·01	+·10	−·36
·07	·20	·18	·13	·35	..	..	·36	·9	·08	·08	·04	·00	·04
4·52	4·45	4·29	4·29	4·08	..	..	4·05	35·9	4·41	4·51	4·03	+·10	−·38
4·00	3·68	3·85	3·73	..	..	..	3·63	30·3	3·88	4·00	3·67	+·12	−·21
3·85	3·85	3·92	3·82	..	..	..	3·74	30·5	3·91	3·86	3·69	−·05	−·22
4·14	3·87	3·80	3·61	..	..	..	3·46	30·7	3·94	4·14	3·73	+·20	−·21
4·00	4·00	3·87	3·70	..	..	..	3·56	30·7	3·94	4·01	3·83	+·07	−·11
4·03	3·92	3·64	3·83	..	..	..	3·98	30·6	3·92	4·03	3·88	+·11	−·04
4·00	3·90	3·80	3·75	..	..	..	3·71	31·1	3·99	4·02	3·77	+·03	−·22
4·03	3·87	3·75	3 66	..	..	..	3·59	31·2	4·00	4·05	3·85	+·05	−·15
4·00	4·05	3·97	3·70	..	..	..	3·49	31·5	4·04	4·02	3·80	−·02	−·24
4·17	3·95	4·00	3·77	..	..	..	3·59	31·7	4·08	4·19	3·86	+·11	−·22
4·14	4·11	3·80	3·66	..	..	..	3·55	31·1	4·00	4·13	3·85	+·13	−·15
3·92	4·44	3·61	3·80	..	..	..	3·93	31·6	4·12	3·96	3·74	−·16	−·38
4·14	4·14	4·00	3·80	..	..	..	3·66	31·3	4·08	4·15	3·91	+·07	−·17
3·97	3·92	3·75	3·70	..	..	..	3·67	30·6	4·00	4·02	3·68	+·02	−·32
4·22	3·95	3·80	3·77	..	..	..	3·75	30·3	3·96	4·19	3·79	+·23	−·17
4·14	4·00	3·80	3·85	..	..	..	3·88	30·7	4·02	4·15	3·86	+·13	−·16
·37	·76	·39	·24	..	..	..	·52	1·4	·24	·33	·24	·39	·34
4·05	3·98	3·82	3·74	..	..	..	3·68	30·9	3·99	4·06	3·79	+·07	−·20
4·05	3·97	3·86	3·72	..	..	..	3·59	30·9	3·98	4·06	..	+·08	..
·00	+·01	−·04	+·02	..	..	..	+·09	·0	+·01	·00	..	−·01	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solaní Right Aqueduct—

[*Instruments* { *No.* 12. 3″ *Double-Floats*, *No.* 13. 1⅝″ *Double-Floats*,

Serial No.	1 Date, 1875—76.	2 Depth. Actual. H	Variation.	Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_2	Local Slope. S	4 Wind. From Direction.	Velocity.	To Direction.	Velocity.	5 Timekeeper's Initial	Subsurface past the cen- [Each Velocity is the Nominal 0	1	2	3
Series 12.	22-2-'75	7·65	·00	7	5·75	4·15		..	0	V	15	W	4·00	3·90	3·66	3·90
	,, ,,	·65	·00	7	,,	,,		V	15	NE	20	R	4·05	3·85	4·00	4·05
	26-2- ,,	·60	·00	7	5·80	4·10		V	13	E	14	W	3·85	4·00	3·85	3·80
	,, ,,	·60	·00	7	,,	,,		V	13	NW	8	R	3·75	3·75	3·75	3·80
	,, ,,	·60	·00	7	,,	,,		NW	8	W	17	W	3·66	3·80	3·75	3·61
	,, ,,	·60	·00	7	,,	,,		W	17	W	20	R	3·80	3·70	3·95	3·90
	,, ,,	·60	·00	7	,,	,,		E	17	W	22	W	3·61	3·75	3·85	3·85
	,, ,,	·60	·00	7	,,	,,		W	22	V	17	R	3·95	3·85	3·90	3·85
	24-2- ,,	·55	·00	7	5·85	4·05		..	0	..	0	W	3·75	3·80	3·95	3·95
	,, ,,	·58	+·05	7	5·82	4·08		..	0	SE	6	R	3·66	3·85	3·75	3·70
	,, ,,	·60	·00	7	5·80	4·10		SE	6	SE	9	W	3·61	3·85	4·00	3·61
	,, ,,	·60	·00	7	,,	,,		SE	9	SE	20	R	3·70	3·90	3·75	3·75
	,, ,,	·60	·00	7	,,	,,		SE	20	SE	19	W	3·70	3·75	3·90	3·70
	,, ,,	·60	·00	7	,,	,,		SE	19	S	15	R	3·70	3·90	3·90	3·90
	23-2- ,,	·55	·00	7	5·85	4·05		..	0	..	0	W	3·80	3·95	3·85	3·75
	,, ,,	·55	·00	7	,,	,,		..	0	..	0	R	3·75	3·85	3·80	3·95
	,, ,,	·55	·00	7	,,	,,		..	0	..	0	W	3·85	3·85	3·90	3·66
	,, ,,	·55	·00	7	,,	,,		..	0	..	0	R	3·90	3·95	3·80	4·00
	,, ,,	·55	·00	7	,,	,,		..	0	..	0	W	3·95	3·85	3·80	3·70
	,, ,,	·55	·00	7	,,	,,		..	0	..	0	R	3·90	4·05	3·95	3·75
	Not observed.															
δ	Range,	·10	..	0	·10	·10	..	..	..	..	..	..	·44	·35	·34	·44
v	Means of 20,	7·59	..	7	5·81	4·09	..	S δ E 2				..	3·80	3·86	3·85	3·81
v′		Parabolic, (v′)											3·81	3·85	3·85	3·80
Δ		Discrepancies, (v − v′)											−·01	+·01	·00	+·01
Series 13.	21-7-'76	7·11	+·02	6	6·09	3·81	230	..	0	..	0	W	4·14	4·20	4·05	3·97
	,, ,,	·14	+·03	6	6·06	3·84	,,	..	0	..	0	H	4·00	4·03	4·14	4·20
	,, ,,	·16	+·02	6	6·04	3·86	,,	..	0	..	0	W	3·82	4·14	4·14	4·00
	,, ,,	·17	·00	6	6·03	3·87	,,	..	0	..	0	H	4·22	4·17	4·22	4·11
δ	Range,	·06	..	0	·06	·06	000	..	..	..	..	..	·40	·17	·17	·23
v	Means of 4,	7·15	..	6	6·06	385	230		0			..	4·05	4·14	4·14	4·07
v′		Parabolic, (v′)											4·06	4·12	4·13	4·11
Δ		Discrepancies, (v − v′)											−·01	+·02	+·01	−·04

Digitized by Google

CITIES PAST A VERTICAL.

TABLE XII.

CENTRAL VERTICAL.

and 1″ wood Rods
and 1″ tin Tube-Rods].

6								7	8			9	
VELOCITIES tral vertical. mean of three observations].							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
Depths (z).									Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials		
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	z	$(v_{\frac{1}{2}H} - U)$.	$(z - U)$.
3·53	3·66	3·53	3·33	..	..	..	3·20	28·3	3·70	3·59	3·70	−·11	·00
3·90	3·61	3·70	3·29	..	..	..	3·02	28·7	3·75	3·93	3·66	+·18	−·09
3·57	3·41	3·66	3·16	..	..	..	2·86	27·7	3·64	3·62	3·61	−·02	−·03
3·57	3·66	3·41	3·23	..	..	..	3·12	27·5	3·62	3·62	3·45	·00	−·17
3·66	3·49	3·33	3·26	..	..	..	3·22	27·0	3·55	3·65	3·41	+·10	−·14
3·80	3·57	3·57	3·16	..	..	..	2·91	28·7	3·77	3·82	3·61	+·05	−·16
3·75	3·41	3·41	3·13	..	..	..	2·96	27·2	3·57	3·77	3·75	+·20	+·18
3·57	3·61	3·41	2·97	..	..	..	2·71	27·5	3·61	3·63	3·53	+·02	−·08
3·95	3·53	3·37	3·23	..	..	..	3·15	27·7	3·66	3·95	3·49	+·29	−·17
3·80	3·75	3·45	3·30	..	..	..	3·21	27·7	3·66	3·78	3·61	+·12	−·05
3·80	3·45	3·45	3·16	..	..	..	2·99	27·1	3·56	3·76	3·66	+·20	+·10
3·75	3·70	3·45	3·03	..	..	..	2·78	27·5	3·62	3·75	3·49	+·13	−·13
3·66	3·75	3·45	3·12	..	..	..	2·92	27·4	3·61	3·67	3·57	+·06	−·04
3·53	3·41	3·53	3·03	..	..	..	2·73	27·4	3·60	3·60	3·70	·00	+·10
3·61	3·61	3·49	2·97	..	..	..	2·68	27·3	3·62	3·64	3·66	+·02	+·04
3·70	3·53	3·53	3·12	..	..	..	2·89	27·6	3·66	3·76	3·49	+·10	−·17
3 45	3·75	3·37	3·09	..	..	..	2·94	27·3	3·61	3·50	3·23	−·11	−·38
3·75	3·66	3·49	3·30	..	..	..	3·20	28·3	3·75	3·81	3·80	+·06	+·05
3·61	3·70	3·49	3·23	..	..	..	3·09	27·5	3·65	3·63	3·49	−·02	−·16
3·66	3·75	3·53	3·26	..	..	..	3·11	28·1	3·72	3·68	3·57	−·04	−·15
·50	·34	·37	·36	..	..	..	·54	1·7	·22	·45	·57	·40	·56
3·68	3·60	3·48	3·17	..	..	..	2·98	27·7	3·65	3·71	3·57	+·06	−·08
3·72	3·59	3·43	3·22	..	..	..	3·08	27·6	3·64	3·74	..	+·10	..
−·04	+·01	+·05	−·05	..	..	..	−·10	+·1	+·01	−·03	..	−·04	..
4·08	4·00	3·73	3·57	..	..	..	3·55	28·3	3·98	4·03	3·87	+·05	−·11
4·05	3·87	3·75	3·61	..	..	..	3·59	28·4	3·97	4·11	3·83	+·14	−·14
3·97	3·90	3·70	3·70	..	..	..	3·70	28·2	3·94	3·98	3·86	+·04	−·08
4·14	4·11	3·73	3·70	..	..	..	3·69	29·1	4·05	4·13	3·86	+·08	−·09
·17	·24	·05	·13	..	..	..	·15	·9	·11	·15	·04	·10	·11
4·06	3·97	3·73	3·65	..	..	..	3·63	28·5	3·99	4·06	3·86	+·07	−·13
4·04	3·94	3·79	3·60	..	..	..	3·57	28·5	3·99	4·08	..	+·09	..
+·02	+·03	−·06	+·05	..	..	..	+·06	·0	·00	−·02	..	−·02	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Right Aqueduct—

[*Instruments*—1⅝″ *Double-Floats*,

Serial No.	1	2			3			4				5				
	Date, 1876-77-78.	Depth.			Fall of Water-Surface.			Wind.					Subsurface- past the cen-			
								From		To			[Each Velocity is the Nominal			
		Actual.	Variation.	Length of Rod.	Upper 5 miles.	Lower 4½ miles.	Local Slope.	Direction.	Velocity.	Direction.	Velocity.	Timekeeper's Initial.	0	1	2	3
		H		l	F_1	F_3	S									
Series 14.	7-1-'78	6·91	+·05	6	5·94	3·21	213	..	0	S	3	G	3·97	4·14	3·97	4·00
	,, ,,	·93	·00	6	5·92	3·23	,,	S	3	SW	8	P	4·00	4·00	4·14	4·00
	,, ,,	·92	−·03	6	5·93	3·22	,,	SW	8	S	6	G	3·77	4·08	3·90	4·00
	,, ,,	·90	·00	6	5·95	3·20	,,	S	6	S	9	P	3·75	4·11	4·03	4·14
	,, ,,	·90	·00	6	,,	,,	,,	S	9	S	13	G	3·87	3·97	3·97	4·03
	5-1- ,,	·85	·00	6	5·95	3·15	?	W	4	V	4	G	3·97	3·90	3·90	4·00
	,, ,,	·85	·00	6	,,	,,	?	V	4	SW	20	P	3·87	4·29	4·08	4·08
	19-7-'76	·85	·00	6	6·00	3·55	?	NNE	7	..	0	W	4·20	4·14	4·20	4·11
	,, ,,	·85	·00	6	,,	,,	?	..	0	..	0	H	4·26	4·22	4·29	4·00
	20-7- ,,	·65	·00	6	5·95	3·45	?	NE	10	E	12	H	3·70	4·00	3·97	4·03
	11-1-'78	·63	·00	6	5·97	3·03	?	N	8	W	8	P	3·68	3·97	4·22	4·03
	,, ,,	·63	·00	6	,,	,,	?	W	8	S	5	G	3·87	3·97	3·97	4·11
	,, ,,	·63	·00	6	,,	,,	?	S	5	NE	8	P	3·82	3·80	4·08	3·87
	,, ,,	·63	·00	6	,,	,,	?	NE	8	S	5	G	3·77	3·92	4·05	3·87
	,, ,,	·63	·00	6	,,	,,	?	S	5	S	11	P	3·51	3·92	4·17	3·87
	,, ,,	·63	·00	6	,,	,,	?	S	11	V	7	G	3·70	3·90	3·95	3·87
∂	Range,	·30	..	0	·08	·52	?	..	..	..	..	.	·75	·49	·39	·27
v	Means of 10,	6·77	..	6	5·96	3·19	?	S 6 W 3				..	3·86	4·02	4·06	4·00
v′		Parabolic, (v′)											3·89	3·98	4·03	4·01
Δ		Discrepancies, (v − v′)											−·03	+·04	+·03	−·01
Series 15.	29-7-'76	6·25	·00	6	6·25	2·45	Not observed.	N	8	N	6	W	4·11	4·22	4·20	4·26
	,, ,,	·25	·00	6	,,	,,		N	6	N	4	H	4·17	4·22	4·29	3·92
	,, ,,	·25	·00	6	,,	,,		N	4	..	0	W	4·14	4·38	4·17	4·32
	,, ,,	·25	·00	6	,,	,,		..	0	N	10	H	4·22	4·29	4·26	4·20
	,, ,,	·25	·00	6	,,	,,		N	10	N	10	W	4·17	4·26	4·29	4·29
	,, ,,	·25	·00	6	,,	,,		N	10	V	15	H	4·41	4·05	4·32	4·29
	12-12-'77	·15	·00	5½	5·95	2·95		V	5	V	5	G	3·80	4·03	4·03	3·85
	,, ,,	·15	·00	5½	,,	,,		V	5	S	6	P	3·85	3·95	3·95	3·95
	,, ,,	·15	·00	5½	,,	,,		S	10	S	10	G	3·90	4·03	4·00	4·03
∂	Range,	·10	..	·5	·30	·50	..	..	..	..	..	..	·61	·43	·37	·47
v	Means of 9,	6·22	..	5·88	6·15	2·62	..	N 3				..	4·09	4·16	4·17	4·12
v′		Parabolic, (v′)											4·10	4·15	4·16	4·11
Δ		Discrepancies, (v − v′)											−·01	+·01	+·01	+·01

Digitized by Google

TABLE XIII.

CITIES PAST A VERTICAL.

CENTRAL VERTICAL.

and 1" tin Tube-Rods].

6								7	8			9	
VELOCITIES tral vertical. mean of three observations]. Depths (z).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
									Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials		
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	u	$(v_{\frac{1}{2}H} - U)$.	$(u - U)$.
3·92	3·90	3·87	3·77	..	..	..	3·77	27·4	3·97	3·96	3·88	−·01	−·09
3·92	3·87	3·85	3·53	..	..	..	3·53	27·2	3·93	3·96	3·76	+·03	−·17
3·73	3·90	3·75	3·61	..	..	..	3·61	27·1	3·92	3·88	3·75	−·04	−·17
3·73	3·73	3·82	3·61	..	..	..	3·61	27·1	3·93	3·96	3·82	+·03	−·11
3·82	3·92	3·75	3·68	..	..	..	3·68	27·0	3·92	3·94	3·82	+·02	−·10
3·95	3·85	3·68	3·57	..	..	..	3·57	26·5	3·87	3·98	3·74	+·11	−·13
4·00	3·75	3·75	3·75	..	..	..	3·75	27·3	3·98	4·05	3·68	+·07	−·30
4·05	3·75	3·85	?	..	..	..	3·94	27·5	4·01	4·08	3·97	+·07	−·04
3·87	4·17	3·82	?	..	..	..	3·52	27·8	4·06	3·94	3·85	−·12	−·21
3·80	3·85	3·66	?	..	..	..	3·54	25·9	3·90	3·95	3·75	+·05	−·15
3·87	3·90	3·70	3·53	..	..	..	3·53	25·9	3·90	3·98	3·81	+·08	−·09
3·97	3·87	3·75	3·66	..	..	..	3·66	26·1	3·93	4·07	3·79	+·14	−·14
3·90	3·73	3·66	3·61	..	..	..	3·61	25·1	3·79	3·88	3·73	+·09	−·06
3·66	3·59	3·61	3·57	..	..	..	3·57	25·0	3·77	3·80	3·57	+·03	−·20
3·87	3·90	3·59	3·51	..	..	..	3·51	25·4	3·83	3·87	3·66	+·04	−·17
3·73	3·82	3·55	3·43	..	..	..	3·43	25·1	3·79	3·83	3·69	+·04	−·10
·39	·58	·32	?·34	..	..	..	·51	2·8	·29	·28	·40	·26	·26
3·86	3·84	3·72	?3·60	..	..	..	3·61	26·5	3·91	3·95	3·77	+·04	−·14
3·95	3·82	3·65	3·47	..	..	..	3·47	26·3	3·89	3·99	..	+·10	..
−·09	+·02	+·08	+·13	..	..	..	+·14	+·2	+·02	−·04	..	−·06	..
3·97	3·92	3·77	..	..	..	..	3·73	25·6	4·10	4·22	3·81	+·12	−·29
4·11	3·87	3·77	..	..	..	..	3·74	25·0	4·00	3·94	3·73	−·06	−·27
4·00	3·87	3·77	..	..	..	..	3·74	25·9	4·15	4·28	3·77	+·13	−·38
4·05	3·87	3·72	..	..	..	..	3·68	25·6	4·10	4·18	3·76	+·08	−·34
4·17	3·97	3·90	..	..	..	..	3·88	26·0	4·16	4·27	3·81	+·11	−·35
4·05	4·03	3·85	..	..	..	..	3·80	25·8	4·13	4·24	3·87	+·11	−·26
3·97	3·59	3·73	..	..	..	..	3·75	23·6	3·83	3·86	3·59	+·03	−·24
4·00	3·68	4·00	..	..	..	..	4·05	23·9	3·88	3·95	3·76	+·07	−·12
3·68	3·68	3·59	..	..	..	..	3·58	23·9	3·88	4·00	3·80	+·12	−·08
·49	·44	·41	..	..	..	..	·47	2·4	·33	·42	·28	·19	·30
4·00	3·83	3·79	..	..	..	..	3·77	25·0	4·03	4·10	3·77	+·07	−·26
4·02	3·89	3·70	..	..	..	..	3·65	25·1	4·03	4·11	..	+·08	..
−·02	−·06	+·09	..	..	..	..	+·12	−·1	·00	−·01	..	−·01	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

SOLÁNÍ RIGHT AQUEDUCT—

[*Instruments*—$1\frac{5}{8}$″ *Double-Floats,*

Serial No.	Date, 1876.	1 Depth. Actual. H	Depth. Variation.	Depth. Length of Rod. l	2 Fall of Water-Surface. Upper 5 miles. F_1	Fall of Water-Surface. Lower 4½ miles. F_2	Fall of Water-Surface. Local Slope. S	3 Wind. From Direction.	Wind. From Velocity.	Wind. To Direction.	Wind. To Velocity.	4 Timekeeper's Initial.	5 Subsurface past the cen- [Each Velocity is the Nominal 0	1	2	3
Series 16.	26-7-'76	6·00	·00	5	6·30	2·80	250	..	0	..	0	W	4·03	3·97	3·97	3·92
	" "	·00	·00	5	"	"	"	..	0	..	0	H	3·85	4·08	4·00	3·95
	" "	·00	·00	5	"	"	"	..	0	..	0	W	3·95	4·03	4·08	3·97
	" "	·00	·00	5	"	"	"	..	0	..	0	H	4·14	4·17	4·11	4·08
	" "	·00	·00	5	"	"	"	..	0	V	7	W	4·14	4·08	4·08	3·85
	" "	·00	·00	5	"	"	"	V	7	..	0	H	4·03	4·11	4·00	4·05
	" "	·00	·00	5	"	"	"	..	0	..	0	W	3·97	4·00	4·11	3·85
	" "	·00	·00	5	"	"	"	..	0	V	7	H	4·03	4·00	4·03	3·97
	" "	·00	·00	5	"	"	"	V	7	V	7	W	3·87	4·08	4·05	4·03
	" "	·00	·00	5	"	"	"	V	7	V	7	H	3·82	4·00	4·00	3·90
	" "	·00	·00	5	"	"	"	V	7	V	10	W	4·08	4·05	4·03	4·00
	" "	·01	+·01	5	6·29	2·81	"	V	10	V	9	H	3·95	4·00	4·11	3·87
	" "	·02	+·01	5	6·58	2·82	"	V	9	S	12	W	3·92	3·97	4·08	3·80
	" "	·03	+·01	5	6·57	2·83	"	S	12	S	12	H	3·92	4·03	4·05	3·70
	" "	·04	+·01	5	6·56	2·84	"	S	12	S	8	W	3·90	4·20	3·97	3·80
	" "	·05	+·01	5	6·55	2·85	"	S	8	S	9	H	4·03	4·17	4·08	3·97
δ	Range,	·05	..	0	·28	·05	000	..	..	..	..	..	·32	·23	·14	·38
v	Means of 16.	6·01	..	5	6·37	2·81	250			S 4		..	3·98	4·06	4·05	3·92
v'		Parabolic, (v')											3·99	4·04	4·03	3·96
Δ		Discrepancies, ($v - v'$)											−·01	+·02	+·02	−·04
Series 17.	27-7-'76	5·55	·00	5	6·35	3·05	300	S	6	S	7	H	3·70	3·87	3·61	3·70
	" "	·55	·00	5	"	"	"	S	7	S	6	W	3·75	3·85	3·77	3·82
	" "	·55	·00	5	"	"	"	S	6	S	6	H	3·77	3 92	3·87	3·75
δ	Range,	·00	..	0	·00	·00	000	..	..	..	..	..	·07	·07	·26	·12
v	Means of 3,	5·55	..	5	6·35	3·05	300			S 6		..	3·74	3·88	3·75	3·76
v'		Parabolic, (v')											3·76	3·82	3·81	3·73
Δ		Discrepancies, ($v - v'$)											−·02	+·06	−·06	+·03

Digitized by Google

TABLE XIV.

CITIES PAST A VERTICAL.

CENTRAL VERTICAL.

and 1″ tin Tube-Rods].

6								7	8				9	
VELOCITIES tral vertical. mean of three observations). Depths (z).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.				DIFFERENCES	
									Discharge. Depth	Mid-depth Velocity.	Mod Velocity Mean of 6 trials			
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	u		$(v_{\frac{1}{2}H} - U)$.	$(u - U)$.
3·85	3·68	Not observed.	..	..	..	..	3·51	23·2	3·86	3·92	3·80		+·06	−·06
3·87	3·61		..	..	..	..	3·35	23·1	3·85	3·95	3·86		+·10	+·01
4·00	3·70		..	..	..	..	3·40	23·5	3·91	3·97	3·85		+·06	−·06
3·82	3·68		..	..	..	..	3·54	23·7	3·95	4·08	3·79		+·13	−·16
3·80	3·75		..	..	..	..	3·70	23·5	3·92	3·85	3·81		−·07	−·11
3·85	3·64		..	..	..	..	3·43	23·4	3·90	4·05	3·81		+·15	−·09
3·73	3·61		..	..	..	..	3·49	23·0	3·84	3·85	3·76		+·01	−·08
3·80	3·85		..	..	..	..	3·90	23·6	3·94	3·97	3·82		+·03	−·12
3·75	3·61		..	..	..	..	3·47	23·2	3·87	4·03	3·75		+·16	−·12
3·73	3·66		..	..	..	..	3·59	23·0	3·83	3·90	3·88		+·07	+·05
3·82	3·70		..	..	..	..	3·58	23·4	3·91	4·00	3·81		+·09	−·10
3·92	3·73		..	..	..	..	3·54	23·4	3·90	3·87	3·79		−·03	−·11
3·73	3·68		..	..	..	..	3·63	23·1	3·84	3·80	3·85		−·04	+·01
3·80	3·70		..	..	..	..	3·60	23·2	3·84	3·70	3·85		−·14	+·01
3·75	3·70		..	..	..	..	3·65	23·4	3·87	3·80	3·87		−·07	·00
3·90	3·70		..	..	..	..	3·49	23·8	3·93	3·97	3·87		+·04	−·06
·27	·24	..	..	..	..	..	·50	·8	·12	·38	·13		·30	·21
3·82	3·69	..	..	..	..	..	3·56	23·3	3·89	3·92	3·82		+·03	−·07
3·83	3·65	..	..	..	..	..	3·40	23·3	3·87	3·96	..		+·09	..
−·01	+·04	..	..	..	..	..	+·16	·0	+·02	−·04	..		−·06	..
3·61	3·33	..	..	..	..	..	3·18	20·1	3·62	3·68	3·57		+·06	−·05
3·59	3·41	..	..	..	..	..	3·31	20·5	3·69	3·81	3·58		+·12	−·11
3·47	3·37	..	..	..	..	..	3·31	20·4	3·68	3·78	3·64		+·10	−·04
·14	·08	..	..	..	..	..	·13	·4	·07	·13	·07		·06	·07
3·56	3·37	..	..	..	..	..	3·27	20·3	3·66	3·76	3·60		+·10	−·06
3·58	3·35	..	..	..	..	..	3·19	20·3	3·66	3·76	..		+·10	..
−·02	+·02	..	..	..	..	..	+·08	·0	·00	·00	..		·00	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

Soláni Right Aqueduct, [Left

[*Instruments*—$1\frac{5}{8}$″ *Double-Floats*,

Serial No.	1 Date, 1876.	2 Depth. Actual. H	Depth. Variation.	Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_2	Local Slope. s	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.
Series 18.	1-9-'76	4·58	+·05	4	6·47	1·58	Not observed.	N	12	NW	8	W
	" "	·63	+·05	4	6·42	1·63		NW	8	NW	6	H
	" "	·68	+·05	4	6·37	1·68		NW	6	NW	6	W
	" "	·73	+·05	4	6·32	1·73		..	0	N	6	H
δ	Range,	·15	..	0	·15	·15	..	..	..	..	..	..
v	Means of 4,	4·66	..	4	6·40	1·66	..	NW ½ N 6				..
v′		Parabolic, (v)			..	..		..	..	..	..	..
Δ		Discrepancies, (v − v′)			..	..		..	..	..	..	..
Series 19.	1-9-'76	4·04	+·12	3	6·56	1·04	Not observed.	SW	11	..	0	W
	" "	·15	+·10	3	6·45	1·15		..	0	..	0	H
	" "	·20	·00	3	6·40	1·20		..	0	..	0	W
	" "	·20	·00	3	"	"		..	0	SW	6	H
	" "	·22	+·03	3	6·38	1·22		SW	6	SW	5	W
	" "	·28	+·05	3	6·32	1·28		..	0	..	0	H
	" "	·30	·00	3	6·30	1·30		..	0	..	0	W
	" "	·30	·00	3	"	"		..	0	..	0	H
δ	Range,	·26	..	0	·26	·26	..	..	..	..	..	..
v	Means of 8,	4·21	..	3	6·52	1·21	..	SW 2				..
v′		Parabolic, (v′)			..	..		..	..	..	..	..
Δ		Discrepancies, (v − v′)			..	..		..	..	..	..	..
Series 20.	1-9-'76	3·94	+·02	3	6·66	·94	Not observed.	N	8	N	4	W
	" "	·95	·00	3	6·65	·95		N	4	N	4	H
	" "	·95	·00	3	"	"		N	4	..	0	W
	" "	·95	·00	3	"	"		..	0	..	0	H
	" "	·97	+·03	3	6·63	·97		..	0	SSE	7	W
	" "	·98	·00	3	6·62	·98		SSE	7	SW	11	H
	" "	·98	·00	3	"	"		SW	11	SW	11	W
	" "	·98	·00	3	"	"		SW	10	SW	11	H
	" "	4·04	+·12	3	6·56	1·04		SW	11	..	0	W
	" "	·15	+·10	3	6·45	1·15		..	0	..	0	H
δ	Range,	·21	..	0	·21	·21	..	..	..	..	..	..
v	Means of 10,	3·99	..	3	6·61	·99	..	SW 3				..
v′		Parabolic, (v′)			..	..		..	..	..	..	..
Δ		Discrepancies, (v − v′)			..	..		..	..	..	..	..

Digitized by Google

CITIES PAST A VERTICAL. **TABLE XV.**

AQUEDUCT CLOSED]—CENTRAL VERTICAL.

and 1" tin Tube-Rods.

6						7	8			9	
SUBSURFACE-VELOCITIES past the central vertical. [Each Velocity is the mean of three observations]. Nominal Depths (z).					Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
							Discharge / Depth	Mid-depth velocity.	Rod Velocity Mean of 6 trials		
0	1	2	3	4	v_H	D	U	$v_{\frac{1}{4}H}$	z	$(v_{\frac{1}{4}H} - U)$.	$(z - U)$.
6·59	6·45	6·38	6·25	6·06	5·95	28·9	6·31	6·34	6·38	+·03	+·07
5·88	6·52	6·52	6·38	6·25	6·17	29·5	6·37	6·48	6·18	+·11	−·19
6·18	6·45	6·38	6·52	6·12	5·85	29·7	6·35	6·43	6·35	+·08	·00
7·06	6·67	6·45	6·45	6·52	6·57	31·1	6·58	6·45	6·38	−·13	−·20
1·18	·22	·14	·27	·46	·72	2·2	·27	·14	·20	·24	·27
6·43	6·52	6·43	6·40	6·24	6·14	29·8	6·40	6·43	6·32	+·03	−·08
6·44	6·49	6·47	6·39	6·24	6·10	29·8	6·39	6·45	..	+·06	..
−·01	+·03	−·04	+·01	·00	+·04	·0	+·01	−·02	..	−·03	..
5·71	5·82	5·41	5·61	Not observed.	5·82	22·8	5·65	5·41	5·53	−·24	−·12
6·25	5·94	5·77	5·66		5·53	24·1	5·80	5·76	5·61	−·04	−·19
5·66	5·88	5·82	5·61		5·36	24·0	5·71	5·80	5·77	+·09	+·06
6·12	5·88	6·12	5·88		5·59	24·9	5·93	6·10	5·88	+·17	−·05
6·00	6·00	5·82	5·61		5·35	24·3	5·77	5·80	5·82	+·03	+·05
6 38	5·88	6·00	6·00		6·00	25·7	6·00	6·00	6·03	·00	+·03
6·12	6·12	5·88	5·77		5·63	25·4	5·90	5·86	6·00	−·04	+·10
6·18	6·18	6·12	5·88		5·57	25·8	6·00	6·08	5·91	+·08	−·09
·72	·36	·71	·39	..	·65	3·0	·35	·69	·50	·41	·29
6·05	5·96	5·87	5·75	..	5·61	24·6	5·85	5·85	5·82	·00	−·03
6·05	5·96	5·87	5 75	..	5·60	24·6	5·84	5·85	..	+·01	..
·00	·00	·00	·00	..	+·01	·0	+·01	·00	..	−·01	..
5·31	5·66	5·50	5·17	..	4·86	21·2	5·38	5·50	5·48	+·12	+·10
5·82	5·56	5·17	5·22	..	5·27	21·2	5·37	5·18	5·33	−·19	−·04
5·31	5·36	5·46	5·13	..	4·82	20·8	5·27	5·46	5·41	+·19	+·14
5·66	5·66	5·41	5·17	..	4·94	21·3	5·40	5·41	5·38	+·01	−·02
5·41	5·50	5·46	5·26	..	5·07	21·3	5·38	5·46	5 48	+·08	+·10
5·94	5·61	5 71	5·26	..	4·82	21·9	5·50	5·71	5·56	+·21	+·06
5·71	5·66	5·41	5·26	..	5·11	21·7	5·44	5·41	5·50	−·03	+·06
5·41	5·77	5·66	5·26	..	4·87	21·8	5·48	5·66	5·69	+·18	+·21
5·71	5·82	5·41	5·61	..	5·82	22·8	5·65	5·41	5·53	−·24	−·12
6·25	5·94	5·77	5·66	..	5·53	24·1	5·80	5·76	5·61	−·04	−·19
·94	·58	·60	·53	..	1·00	3·3	·53	·58	·36	·45	·40
5·65	5·65	5·50	5·30	..	5·11	21·8	5·47	5·50	5·50	+·03	+·03
5·65	5·64	5·51	5·29	..	4·96	21·8	5·45	5·52	..	+·07	..
·00	+·01	−·01	+·01	..	+·15	·0	+·02	−·02	..	−·04	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Embankment Main Site—

[*Instruments*—1⅝" *Double-Floats*,

Serial No.	Date, 1876-77-78.	2 Depth. Above Datum. h	Actual. H	Variation.	Length of Rod. l	3 Fall of Water-Surface. Upper 4 miles. F_1	1 mile below Site. F_2	Lower 4½ miles. F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Sub-past [Each Nomi- 0	1	2
Series 21.	30-12-'76	9·82	11·00	+·01	9½	4·76	1·17	5·50	?	SW	5	SW	9	W	4·32	4·48	4·38
	„ „	·84	·02	+·03	9½	4·74	„	5·52	?	SW	9	W	12	P	4·35	4·51	4·48
	3-1-'77	·81	10·99	·00	9	4·77	1·18	5·45	218	NE	6	E	9	P	4·65	4·48	4·38
	„ „	·81	·99	·00	9	„	„	„	„	E	9	E	6	W	4·22	4·29	4·44
	„ „	·81	·99	·00	9	„	„	„	„	E	8	E	10	P	4·11	4·32	4·17
	„ „	·81	·99	·00	9	„	„	„	„	E	10	E	14	W	4·29	4·51	4·55
	2-1- „	·70	·88	·00	9	4·78	1·17	5·40	193	..	0	..	0	W	4·32	4·55	4·55
	„ „	·70	·88	·00	9	„	„	„	„	..	0	..	0	P	4·61	4·72	4·55
	„ „	·70	·88	·00	9	„	„	„	„	..	0	..	0	W	4·44	4·48	4·55
	„ „	·71	·89	+·02	9	4·77	„	5·41	„	S	7	SE	5	P	4·17	4·48	4·55
	„ „	·73	·91	+·02	9	4·75	„	5·43	„	SE	5	SW	6	W	4·35	4·72	4·41
	5-1- „	·56	·74	+·02	9	4·77	1·23	5·30	?	NE	10	NE	10	P	4·41	4·48	4·29
	„ „	·57	·75	·00	9	4·76	1·24	„	?	NE	10	NE	5	W	4·61	4·48	4·20
	„ „	·57	·75	·00	9	„	„	„	?	NE	5	E	12	P	4·38	4·48	4·35
	„ „	·57	·75	·00	9	„	„	„	?	E	12	E	9	W	4·44	4·51	4·65
	„ „	·57	·75	·00	9	„	„	„	?	E	4	E	5	P	4·61	4·35	4·55
δ	Range,	·28	·28	..	·5	·04	·07	·22	?	..	..	..	..	..	·54	·43	·48
v	Means of 16,	9·71	10·89	..	9·06	4·77	1·19	5·39	?	E 4				..	4·39	4·49	4·44
v′		Parabolic, (v′)				..	..	..	..	..	..	..	..	..	4·44	4·44	4·42
Δ		Discrepancies, (v − v′)				..	..	..	..	..	..	..	..	..	−·05	+·05	+·02
Series 22.	2-2- '77	6·86	8·03	·00	7	4·57	1·36	3·37	238	..	0	..	0	P	3·45	3·70	3·82
	„ „	·87	·04	+·02	7	4·56	„	3·38	„	..	0	..	0	W	3·41	3·77	3·75
	„ „	·87	·04	−·01	7	„	„	„	„	..	0	..	0	P	3·53	3·47	3·43
	„ „	·88	·05	+·03	7	4·55	„	3·39	„	..	0	SW	9	W	3·57	3·61	3·73
	„ „	·89	·06	−·01	7	4·54	„	3·40	„	SW	9	SW	17	P	3·61	3·66	3·64
	9-1- '78	·82	7·99	−·04	7½	4·61	1·44	2·95	?	S	3	S	7	P	3·57	3·64	3·85
	„ „	·80	·98	−·01	7½	4·63	1·52	2·85	?	S	7	S	3	G	3·41	3·57	3·55
	4-1- „	·74	·91	+·16	7	4·89	1·30	3·11	?	E	5	E δ S	9	G	3·39	3·59	3·61
	17-12-'77	·74	·91	·00	7	4·59	1·41	2·65	?	E δ S	8	SE	7	P	3·39	3·70	3·82
	„ „	·74	·91	·00	7	„	„	„	?	SE	7	SE	19	G	3·55	3·77	3·80
	15-12- „	·72	·89	−·01	7	4·61	1·39	2·85	?	W	5	S	9	G	3·53	3·47	3·73
	4-1- '78	·66	·83	·00	7	4·97	1·38	2·95	?	E	10	E	5	P	3·37	3·68	3·55
	3-1- „	·64	·81	−·01	7	4·64	1·36	2·95	?	E	4	E	11	G	3·35	3·61	3·55
	29-12-'77	·64	·81	·00	7	4·64	1·36	2·95	219	NW	6	..	0	P	3·35	3·53	3·39
	„ „	·64	·81	·00	7	„	„	„	„	..	0	S	7	G	3·66	3·53	3·51
	„ „	·64	·81	·00	7	„	„	„	„	S	7	S	15	P	3·59	3·64	3·55
δ	Range,	·25	·25	..	·5	·43	·22	·75	?	..	..	..	..	..	·31	·30	·46
v	Means of 16,	6·76	7·93	..	7·1	4·64	1·38	3·05	?	SSE 4				..	3·48	3·62	3·64
v′		Parabolic, (v′)				..	..	..	..	..	..	..	..	..	3·51	3·58	3·61
Δ		Discrepancies, (v − v′)				..	..	..	..	..	..	..	..	..	−·03	+·04	+·03

Digitized by Google

CITIES PAST A VERTICAL.

TABLE XVI.

CENTRAL VERTICAL.

and 1″ tin Tube-Rods].

6									7	8			9	
SURFACE VELOCITIES the central vertical. Velocity is the mean of three observations.]								Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
nal Depths (*s*).										Discharge ÷ Depth	Mid-depth Velocity.	Rod Velocity. Mean of 6 trials		
3	4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	u	$(v_{\frac{1}{2}H} - U)$.	$(u - U)$.
4·08	4·26	4·22	4·05	4·05	4·17	4·26	4·08	3·90	46·2	4·20	4·13	3·90	−·07	−·30
4·55	4·61	4·05	4·32	4·22	4·20	3·92	4·11	4·30	47·2	4·28	4·19	3·95	−·09	−·33
4·48	4·41	4·29	4·48	4·51	4·48	4·14	4·11	4·08	48·0	4·37	4·39	3·95	+·02	−·42
4·38	4·11	4·29	4·29	4·08	4·05	3·95	3·92	3·89	45·8	4·17	4·29	3·93	+·12	−·24
4·11	4·22	4·05	4·08	4·20	4·00	3·80	4·08	4·36	45·4	4·13	4·07	3·93	−·06	−·20
4·20	4·44	4·26	3·95	3·92	3·95	4·03	3·92	3·81	45·7	4·16	4·10	4·04	−·06	−·12
4·55	4·44	4·29	4·41	4·41	4·17	4·00	4·20	4·38	47·4	4·36	4·34	3·97	−·02	−·39
4·42	4·80	4·51	4·41	4·41	4·20	4·20	4·26	4·31	48·4	4·45	4·47	4·15	+·02	−·30
4·51	4·51	4·32	4·26	4·32	4·17	4·03	3·97	3·92	46·8	4·30	4·29	4·10	−·01	−·20
4·58	4·51	4·26	4·55	4·48	4·08	4·03	4·11	4·18	47·4	4·35	4·39	4·10	+·04	−·25
4·26	4·61	4·44	4·44	4·32	4·32	4·32	4·17	4·03	47·8	4·38	4·44	4·33	+·06	−·05
4·29	4·20	4·20	4·11	4·17	4·29	3·90	3·95	3·99	45·0	4·19	4·17	3·83	−·02	−·36
4·58	4·22	4·05	3·90	3·80	4·17	3·92	4·17	4·36	44·9	4·18	3·99	3·90	−·19	−·28
4·35	4·55	4·38	4·22	4·22	4·29	4·14	4·05	3·98	46·2	4·30	4·32	3·68	+·02	−·62
4·48	4·58	4·14	4·32	3·77	4·00	4·11	3·85	3·65	45·3	4·21	4·21	3·87	·00	−·34
4·41	4·35	4·48	4·11	4·14	4·29	4·29	4·17	4·08	46·5	4·32	4·34	3·96	+·02	−·36
·50	·69	·46	·65	·74	·53	·52	·41	·73	3·5	·32	·48	·65	·31	·57
4·89	4·43	4·26	4·24	4·19	4·18	4·07	4·07	4·08	46·5	4·27	4·26	3·97	−·01	−·30
4·40	4·37	4·33	4·28	4·22	4·15	4·07	3·98	3·89	46·4	4·26	4·31	..	+·05	..
−·01	+·06	−·07	−·04	−·03	+·03	·00	+·09	+·19	+·1	+·01	−·05	..	−·06	..
3·87	3·55	3·31	3·39	3·14	?	..	..	2·88	28·1	3·50	3·55	3·33	+·05	−·17
3·57	3·57	3·53	3·33	3·35	?	..	..	3·37	28·4	3·53	3·57	3·34	+·04	−·19
3·41	3·57	3·16	3·28	3·43	?	..	..	3·59	27·2	3·39	3·56	3·23	+·17	−·16
3·53	3·49	3·41	3·33	3·21	?	..	..	3·08	27·7	3·44	3·49	3·26	+·05	−·18
3·53	3·37	3·39	3·24	3·21	?	..	..	3·18	27·7	3·44	3·37	3·21	−·07	−·23
3·68	3·35	3·61	3·28	3·26	3·47	..	..	3·47	28·2	3·53	3·35	3·31	−·18	−·22
3·75	3·55	3·68	3·41	3·33	3·37	..	..	3·37	28·3	3·55	3·55	3·26	·00	−·29
3·59	3·55	3·51	3·47	3·35	3·35	..	..	3·35	27·7	3·51	3·55	3·28	+·04	−·23
3·45	3·77	3·45	3·21	3·28	3·16	..	..	3·16	27·6	3·48	3·76	3·19	+·28	−·29
3·59	3·55	3·49	3·38	3·23	3·17	..	..	3·17	27·8	3·52	3·55	3·26	+·03	−·26
3·33	3·55	3·19	3·23	3·14	3·31	..	..	3·31	26·4	3·35	3·54	3·33	+·19	−·02
3·73	3·68	3·43	3·41	3·21	3·23	..	..	3·23	27·4	3·50	3·68	3·34	+·18	−·16
3·51	3·57	3·30	3·35	3·30	3·26	..	..	3·26	26·8	3·44	3·56	3·35	+·12	−·09
3·47	3·68	3·49	3·28	3·28	3·24	..	..	3·24	26·8	3·43	3·66	3·41	+·23	−·02
3·61	3·51	3·28	3·41	3·26	3·31	..	..	3·31	26·9	3·44	3·52	3·27	+·08	−·17
3·57	3·51	3·47	3·39	3·21	3·14	..	..	3·14	27·1	3·47	3·52	3·24	+·05	−·23
·54	·42	·52	·26	·29	? ·33	..	..	·71	2·0	·20	·41	·22	·46	·27
3·57	3·55	3·42	3·34	3·26	? 3·27	..	..	3·26	27·5	3·47	3·55	3·29	+·08	−·18
3·60	3·55	3·47	3·34	3·18	2·98	..	..	2·98	27·4	3·45	3·56	..	+·11	..
−·03	·00	−·05	·00	+·08	+?·29	..	..	+·28	+·1	+·02	−·01	..	−·03	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Embankment Main Site—

[*Instruments*—1⅝″ *Double-Floats,*

Serial No.	1	2				3				4				5	
		Depth.				Fall of Water-Surface.				Wind.					
										From		To			
	Date, 1876-77.	Above Datum.	Adjust.	Variation.	Length of Rod.	Upper 4 miles.	1 mile below Site.	Lower 4½ miles.	Local Slope.	Direction.	Velocity.	Direction.	Velocity.	Timekeeper's Initial.	
		h	H		l	F_1	F_2	F_3	S						
Series 23.	25-10-'76	6·63	7·80	·00	6	5·20	1·15	3·35	Not observed.	..	0	..	0	P	
	„ „	·63	·80	−·01	6	„	„	„		..	0	..	0	W	
	„ „	·62	·79	·00	6	5·21	„	3·34		..	0	..	0	P	
	„ „	·62	·79	·00	6	„	„	„		..	0	..	0	W	
	„ „	·62	·79	−·01	6	„	„	„		..	0	..	0	P	
	„ „	·61	·78	−·01	6	5·22	„	3·33		..	0	..	0	W	
	„ „	·61	·78	+·01	6	„	„	„		..	0	..	0	P	
	„ „	·61	·78	−·01	6	„	„	„		..	0	..	0	W	
	„ „	·61	·78	+·01	6	„	„	„		..	0	..	0	P	
	„ „	·60	·77	−·02	6	5·23	„	3·32		..	0	..	0	W	
δ	Range,	·03	·03	..	0	·03	·00	·03	..	..	..	..	..	..	
v	Means of 10,	6·62	7·79	..	6	5·21	1·15	3·34	..	Calm				..	
v′		Parabolic, (v′) ..				..	..	..	..	..	..	..	..	..	
Δ		Discrepancies, (v−v′)					..	..	..	..	..	..	..	..	
Series 24.	25-1-'77	6·15	7·33	+·01	6½	4·63	1·42	2·90	230	W δ N	4	W	10	P	
	„ „	·17	·35	+·03	6½	4·61	„	2·92	„	W	10	NW	10	W	
	„ „	·20	·38	+·03	6½	4·58	„	2·95	„	NW	10	W	6	P	
	„ „	·22	·40	+·02	6½	4·61	„	2·97	„	W	6	SW	12	W	
	5-7-„	·26	·44	·00	7	4·67	1·38	2·55	?	SW	6	SW	7	P	
	„ „	·26	·44	·00	7	„	„	„	?	SW	7	W	21	W	
δ	Range,	·11	·11	..	·50	·09	·04	·22	?	..	..	..	..	..	
v	Means of 6,	6·21	7·39	..	6·67	4·63	1·41	2·81	?	W 8				..	
v′		Parabolic, (v′) ..				..	..	..	..	..	..	..	..	..	
Δ		Discrepancies, (v−v′)					..	..	..	..	..	..	..	..	

Subsur- past the [Each Velocity Nomi-

0	1	2
4·08	4·44	4·17
4·29	4·32	4·29
4·14	4·55	4·26
4·26	4·38	4·29
4·38	4·22	4·58
4·32	4·32	4·20
4·29	4·05	4·00
4·32	4·55	4·22
4·35	4·26	4·17
4·17	4·55	4·32
·30	·50	·58
4·26	4·36	4·25
4·29	4·29	4·26
−·03	+·07	−·01
3·33	3·49	3·45
3·43	3·61	3·33
3·17	3·37	3·41
3·45	3·35	3·37
3·51	3·51	3·39
3·43	3·57	3·53
·34	·26	·20
3·39	3·48	3·41
3·42	3·43	3·42
−·03	+·05	−·01

Digitized by Google

TABLE XVII.

CITIES PAST A VERTICAL.

CENTRAL VERTICAL.

and 1" tin Tube-Rods].

6									7	8			9	
FACE VELOCITIES central vertical. is the mean of three observations). nal Depths (z).								Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
										Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials		
3	4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	u	$(v_{\frac{1}{2}H} - U)$.	$(u - U)$.
4·17	3·87	4·05	3·92	Not observed.	..	..	..	3·69	31·9	4·09	3·90	3·85	−·19	−·24
4·20	4·08	4·03	3·87		..	..	..	3·58	31·8	4·07	4·09	3·99	+·02	−·08
4·20	4·20	4·14	3·87		..	..	..	3·39	32·0	4·11	4·20	3·99	+·09	−·12
4·29	4·22	4·17	3·95		..	..	..	3·56	32·3	4·14	4·23	4·03	+·09	−·11
4·03	4·14	4·11	3·90		..	..	..	3·52	31·5	4·04	4·13	3·99	+·09	−·05
4·41	4·14	4·03	3·95		..	..	..	3·81	32·4	4·16	4·17	4·05	+·01	−·11
4·08	3·97	3·85	3·77		..	..	..	3·63	30·6	3·93	3·98	3·90	+·05	−·03
4·29	4·17	4·26	3·87		..	..	..	3·18	32·2	4·14	4·18	4·00	+·04	−·14
4·08	4·11	4·08	3·70		..	..	..	3·02	30·7	3·95	4·11	3·97	+·16	+·02
3·97	3·95	4·08	3·92		..	..	..	3·64	31·7	4·08	3·95	3·92	−·13	−·16
·44	·35	·41	·25	..	..	..	..	·79	1·8	·23	·33	·20	·35	·26
4·17	4·09	4·08	3·87	..	..	..	..	3·50	31·7	4·07	4·09	4·00	+·02	−·07
4·21	4·13	4·02	3·88	..	..	..	..	3·56	31·7	4·07	4·14	..	+·07	..
−·04	−·04	+·06	−·01	..	..	..	..	−·06	·0	·00	−·05	..	−·05	..
3·30	3·23	3·17	3·11	2·83	..	..	..	2·74	23·8	3·24	3·25	3·17	+·01	−·07
3·35	3·26	3·28	3·08	2·93	..	..	..	2·88	24·3	3·31	3·29	3·14	−·02	−·17
3·47	3·23	3·09	2·82	2·90	..	..	..	2·93	23·7	3·21	3·30	3·13	+·09	−·08
3·28	3·17	3·03	3·03	2·88	..	..	..	2·82	23·5	3·17	3·20	3·13	+·03	−·04
3·43	3·33	3·24	2·99	2·88	..	..	..	2·83	24·5	3·29	3·36	3·22	+·07	−·07
3·45	3·30	3·30	3·06	3·06	..	..	..	3·06	24·9	3·35	3·34	3·04	−·01	−·31
·19	·16	·27	·29	·23	..	..	..	·32	1·4	·18	·16	·18	·11	·27
3·38	3·25	3·19	3·02	2·91	..	..	..	2·88	24·1	3·26	3·29	3·14	+·03	−·12
3·37	3·29	3·18	3·04	2·86	..	..	..	2·78	24·0	3·25	3·32	..	+·07	..
+·01	−·04	+·01	−·02	+·05	..	..	..	+·10	+·1	+·01	−·03	..	−·04	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Embankment Main Site—

[*Instruments*—1⅝″ *Double-Floats*,

Serial No.	Date, 1876.	2 Depth. Above Datum. h	Actual. H	Variation.	Length of Rod. l	3 Fall of Water-Surface. Upper ¼ miles. F_1	1 mile below Site. F_2	Lower ¼ miles. F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Subsurface past the [Each Velocity Nomi- 0	1	2
Series 25.	23-10-'76	6·06	7·24	−·03	6	5·17	1·23	3·00		..	0	..	0	W	3·75	3·97	3·95
	„ „	·06	·24	−·01	6	„	„	„		..	0	NE	5	H	4·00	4·11	4·14
	„ „	·06	·24	+·01	6	„	„	„		NE	5	NE	7	W	3·70	3·82	3·85
	„ „	·06	·24	−·01	6	„	„	„		NE	7	NE	6	H	3·80	3·85	3·80
	„ „	·05	·23	·00	6	5·18	„	2·99		NE	6	NE	8	W	3·75	4·03	3·90
	„ „	·05	·23	−·01	6	„	„	„		NE	8	NE	10	H	3·87	4·05	3·95
	„ „	·04	·22	·00	6	5·19	„	2·98		NE	10	NE	10	W	3·95	3·68	3·77
	„ „	·04	·22	·00	6	„	„	„		NE	10	ENE	12	H	3·75	3·61	3·66
	„ „	·12	·30	+·01	6	5·31	1·24	3·05		SW	4	W	7	W	3·90	4·08	3·95
	„ „	·13	·31	+·01	6	5·30	„	3·06		W	7	NW	5	H	3·97	4·11	4·14
	„ „	·14	·32	+·01	6	5·29	„	3·07		NW	5	NW	4	W	4·14	3·97	3·95
	„ „	·15	·33	+·02	6	5·28	„	3·08		NW	4	NW	4	H	3·95	3·95	3·95
δ	Range,	·11	·11	..	0	·14	·01	·10	..	..	..	..	..	..	·44	·50	·48
v	Means of 12,	6·08	7·26	..	6	5·22	1·23	3·02	..			NNE 4		..	3·88	3·94	3·92
v′		Parabolic, (v′)				..	..	..	..	..	..	..	..	..	3·89	3·92	3·91
△		Discrepancies, (v − v′)				..	..	..	..	..	..	..	..	..	−·01	+·02	+·01
Series 26.	13-10-'76	5·29	6·47	+·01	5	4·89	·91	1·35		SW	7	SW	12	H	2·97	3·16	2·97
	„ „	·30	·48	+·01	5	4·88	„	1·36		SW	12	SE	8	W	2·82	3·03	2·97
	„ „	·31	·49	+·01	5	4·87	„	1·37		SE	8	SSW	12	H	2·99	2·90	3·05
	„ „	·32	·50	+·01	5	4·86	„	1·38		SW	12	S	5	W	2·90	3·06	3·00
	„ „	·33	·51	+·01	5	4·85	„	1·39		S	5	SE	14	H	2·82	3·11	2·93
	„ „	·34	·52	+·02	5	4·84	„	1·40		SE	14	S	8	W	2·97	3·09	3·05
	„ „	·35	·53	·00	5	4·83	„	1·41		S	8	S	5	H	2·91	3·08	3·08
δ	Range,	·06	·06	..	0	·06	·00	·06	..	..	..	..	..	..	·17	·26	·15
v	Means of 7,	5·32	6·50	..	5	4·86	·91	1·38	..			S 7		..	2·91	3·06	3·01
v′		Parabolic, (v′)				..	..	..	..	..	..	..	..	..	2·94	3·01	3·01
△		Discrepancies, (v − v′)				..	..	..	..	..	..	..	..	..	−·03	+·05	·00

Digitized by Google

TABLE XVIII.

CITIES PAST A VERTICAL.

CENTRAL VERTICAL.

and 1″ tin Tube-Rods].

6									7	8			9	
FACE VELOCITIES central vertical. is the mean of three observations.] nal Depths (s).								Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations,			DIFFERENCES	
										Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials		
3	4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{4}H}$	u	$(v_{\frac{1}{4}H} - U)$.	$(u - U)$.
3·73	3·70	3·45	3·53	Not observed.	..	..	..	3·63	26·8	3·70	3·71	3·53	+·01	−·17
3·82	3·59	3·87	3·47		..	..	..	2·97	27·4	3·78	3·68	3·75	−·10	−·03
3·64	3·70	3·73	3·45		..	..	..	3·10	26·4	3·64	3·68	3·60	+·04	−·04
3·97	3·95	3·68	3·49		..	..	..	3·25	27·1	3·75	3·96	3·57	+·21	−·18
3·87	3·66	3·68	3·59		..	..	..	3·48	27·4	3·78	3·74	3·63	−·04	−·15
3·66	3·55	3·57	3·57		..	..	..	3·57	26·9	3·72	3·59	3·46	−·13	−·26
3·87	3·77	3·37	3·53		..	..	..	3·73	26·5	3·67	3·81	3·42	+·14	−·25
3·70	3·61	3·49	3·37		..	..	..	3·22	25·7	3·55	3·65	3·32	+·10	−·23
3·95	3·97	3·64	3·57		..	..	..	3·48	27·9	3·82	3·96	3·51	+·14	−·31
3·95	3·95	3·85	3·57		..	..	..	3·20	28·2	3·85	3·95	3·52	+·10	−·33
4·00	3·92	3·85	3·64		..	..	..	3·36	28·8	3·86	3·95	3·55	+·09	−·31
3·92	4·08	3·90	3·55		..	..	..	3·08	27·9	3·81	4·03	3·49	+·22	−·32
·36	·53	·53	·27	..	..	..	..	·76	2·6	·31	·44	·43	·35	·30
3·84	3·79	3·67	3·53	..	..	..	..	3·34	27·2	3·74	3·81	3·53	+·07	−·21
3·97	3·79	3·67	3·52	..	..	..	..	3·27	27·2	3·74	3·82	..	+·08	..
−·03	·00	·00	+·01	..	..	..	..	+·07	·0	·00	−·01	..	−·01	..
2·91	2·80	2·68		Not observed.	..	..	..	2·50	18·5	2·86	2·88	2·82	+·02	−·04
3·01	2·75	2·79			..	..	..	2·85	18·7	2·89	2·95	2·82	+·06	−·01
2·80	2·84	2·80			..	..	..	2·74	18·6	2·87	2·81	2·83	−·06	−·04
2·90	2·91	2·54			..	..	..	1·98	18·0	2·77	2·90	2·86	+·13	+·09
2·99	2·83	2·63			..	..	..	2·33	18·3	2·82	2·95	2·76	+·13	−·06
2·86	2·70	2·64			..	..	..	2·55	18·5	2·83	2·82	2·78	−·01	−·05
2·78	2·93	2·78			..	..	..	2·55	18·8	2·88	2·82	2·81	−·06	−·07
·23	·23	·26	..	..	..	..	..	·87	·8	·12	·14	·12	·19	·16
2·89	2·82	2·69	..	..	..	..	..	2·50	18·5	2·85	2·88	2·82	+·03	−·03
2·95	2·82	2·63	..	..	..	..	..	2·22	18·3	2·81	2·92	..	+·11	..
−·06	·00	+·06	..	..	..	..	..	+·28	+·2	+·04	−·04	..	−·08	..

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Embankment Main Site—

[*Instruments*—$1\frac{5}{8}$" *Double-Floats*,

Serial No.	Date, 1876.	1	2 Depth. Above Datum. h	2 Depth. Actual. H	2 Depth. Variation.	2 Length of Rod. l	3 Fall of Water-Surface. Upper 4 miles. F_1	3 Fall of Water-Surface. 1 mile below Site. F_2	3 Fall of Water-Surface. Lower 4½ miles. F_3	3 Fall of Water-Surface. Local Slope. S	4 Wind. From Direction.	4 Wind. From Velocity.	4 Wind. To Direction.	4 Wind. To Velocity.	5 Timekeeper's Initial.	Subsurface past the [Each Velocity Nomi- 0	1	2
Series 27.	16-10-'76		5·10	6·28	·00	5	4·98	1·12	2·45		..	0	..	0	W	3·26	3·30	3·14
	" "		·10	·28	−·01	5	"	"	"		..	0	..	0	H	3·19	3·33	3·30
	" "		·09	·27	−·01	5	4·99	"	2·44		..	0	..	0	W	3·19	3·39	3·41
	" "		·08	·26	·00	5	5·00	"	2·43		..	0	..	0	H	3·35	3·39	3·43
	" "		·08	·26	−·01	5	"	"	"		..	0	..	0	W	3·31	3·53	3·39
	" "		·07	·25	·00	5	5·01	"	2·42		..	0	..	0	H	3·37	3·24	3·41
	" "		·07	·25	·00	5	"	"	"		..	0	..	0	W	3·33	3·21	3·45
	" "		·07	·25	−·01	5	"	"	"		..	0	..	0	H	3·35	3·49	3·45
	" "		·06	·24	·00	5	5·02	"	2·41		..	0	..	0	W	3·45	3·55	3·39
	" "		·06	·24	−·01	5	"	"	"		..	0	..	0	H	3·49	3·41	3·33
	" "		·05	·23	−·01	5	5·03	"	2·40		..	0	..	0	W	3·30	3·31	3·41
	" "		04	·22	·00	5	5·04	"	2·39		..	0	N	7	H	3·51	3·30	3·41
	" "		·04	·22	·00	5	"	"	"		N	7	N ð E	5	W	3·31	3·41	3·41
	" "		·04	·22	−·01	5	"	"	"		N ð E	5	N ð E	8	H	3·41	3·30	3·09
	" "		·03	·21	·00	5	5·05	"	2·38		N ð E	8	N ð E	6	W	3·21	3·43	3·37
	" "		·03	·21	−·01	5	"	"	"		N ð E	6	N	8	H	3·33	3·30	3·37
	δ Range,		·07	·07	..	·0	·07	·00	·07	..	..	..	..	..	..	·32	·34	·36
	v Means of 16,		5·06	6·24	..	5	5·02	1·12	2·41	..		N 2			..	3·34	3·37	3·36
	v′		Parabolic, (v′) ..				..	..	..		..	..	..	..		3·34	3·37	3·35
	Δ		Discrepancies, (v − v′) ..				..	..	..		..	..	..	..		·00	·00	+·01
Series 28.	13-10-'76		5·09	6·27	+·01	5	4·74	·91	1·15		..	0	..	0	P	2·78	2·94	2·65
	" "		·10	·28	+·01	5	4·73	"	1·16		..	0	..	0	W	3·24	2·86	2·91
	" "		·10	·28	·00	5	"	"	"		..	0	..	0	P	2·80	3·00	2·91
	" "		·10	·28	·00	5	"	"	"		..	0	..	0	W	2·91	2·86	2·86
	" "		·10	·28	·00	5	"	"	"		..	0	..	0	P	2·91	2·88	2·88
	" "		·10	·28	·00	5	"	"	"		..	0	..	0	W	2·79	2·86	2·80
	" "		·10	·28	·00	5	"	"	"		..	0	..	0	P	2·75	2·94	2·56
	" "		·10	·28	·00	5	"	"	"		..	0	W ð S	25	W	2·78	2·79	2·84
	12-10- "		4·88	·06	−·01	5	4·65	·90	1·10		ENE	12	ENE	9	H	2·79	2·78	2·73
	" "		·87	·05	·00	5	4·66	"	1·09		ENE	9	ENE	8	W	2·88	2·76	2·68
	" "		·87	·05	−·01	5	"	"	"		ENE	8	E	10	H	2·67	2·64	2·80
	" "		·87	·05	+ 01	5	"	"	"		E	10	E	13	W	2·99	2·63	2·69
	" "		·87	·05	−·01	5	"	"	"		E	13	E	11	H	2·88	2·79	2·75
	" "		·86	·04	·00	5	4·67	"	1·08		E	11	E	15	W	2·76	2·80	2·72
	" "		·86	·04	·00	5	"	"	"		E	15	E	12	H	2·75	2·78	2·82
	" "		·87	·05	+·01	5	4·66	"	1·09		E	12	E	18	W	2·79	2·79	2·74
	δ Range,		·24	·24	..	·0	·09	·01	·08	..	..	..	..	..	..	·57	·37	·35
	v Means of 16,		4·98	6·16	..	5	4·70	·91	1·12	..		E 5			..	2·84	2·82	2·77
	v′		Parabolic, (v′) ..				..	..	..		..	..	..	..		2·84	2·82	2·77
	Δ		Discrepancies, (v − v′)				..	..	..		..	..	..	..		·00	·00	·00

Digitized by Google

TABLE XIX.

CITIES PAST A VERTICAL.

CENTRAL VERTICAL.

and 1″ tin Tube-Rods].

6										7	8			9	
FACE VELOCITIES central vertical.								Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.				DIFFERENCES	
is the mean of three observations.]										Discharge / Depth	Mid-depth Velocity.	Rod Velocity / Mean of 6 trials			
nal Depths (*s*).															
3	4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{4}H}$	*u*		$(v_{\frac{1}{4}H} - U)$.	$(u - U)$.
3·11	3·14	2·94		..	..	..	..	2·68	19·4	3·09	3·11	3·06		+ ·02	− ·03
3·31	3·30	3·09		..	..	..	..	2·82	20·2	3·21	3·31	2·83		+ ·10	− ·38
3·19	3·11	3·08		..	..	..	..	3·04	20·1	3·21	3·18	3·18		− ·03	− ·03
3·35	3·31	3·01		..	..	..	..	2·63	20·2	3·23	3·34	3·08		+ ·11	− ·15
3·53	3·33	3·09		..	..	..	..	2·79	20·7	3·30	3·50	3·30		+ ·20	− ·01
3·11	3·13	3·00		..	..	..	..	2·84	19·7	3·16	3·11	3·07		− ·05	− ·09
3·35	3·33	2·96		..	..	..	..	2·50	19·9	3·18	3·35	3·12		+ ·17	− ·06
3·21	3·13	3·16		..	..	..	..	3·20	20·5	3·28	3·20	3·19		− ·08	− ·09
3·31	3·06	3·13		..	..	..	..	3·22	20·5	3·29	3·28	3·11		− ·01	− ·18
3·26	3·23	3·00		..	..	..	..	2·71	20·0	3·21	3·26	3·13		+ ·05	− ·08
3·33	3·05	2·93		..	..	..	..	2·78	19·7	3·17	3·30	3·17		+ ·13	·00
3·13	3·09	3·03		..	..	..	..	2·96	19·9	3·19	3·13	3·23		− ·06	+ ·04
3·33	3·13	3·03		..	..	..	..	2·91	20·1	3·23	3·31	3·11		+ ·08	− ·12
3·28	3·39	3·01		..	..	..	..	2·55	19·7	3·16	3·29	3·08		+ ·13	− ·08
3·24	3·17	2·99		..	..	..	..	2·77	19·8	3·19	3·23	3·14		+ ·04	− ·05
3·30	3·13	3·24		..	..	..	..	3·37	20·4	3·29	3·28	3·02		− ·01	− ·27
·42	·34	·31	..	..	..	..	..	·87	1·3	·21	·39	·46		·28	·42
3·27	3·19	3·04	..	..	..	..	..	2·86	20·1	3·21	3·26	3·11		+ ·05	− ·10
3·29	3·18	3·04	..	..	..	..	..	2·79	20·0	3·21	3·28	..		+ ·07	..
− ·02	+ ·01	·00	..	..	..	..	..	+ ·07	+ ·1	·00	− ·02	..		− ·02	..
2·68	2·50	2·46	..	..	..	..	..	2·41	16·5	2·63	2·65	2·65		+ ·02	+ ·02
2·84	2·75	2·46	..	..	..	..	..	2·09	17·1	2·73	2·83	2·67		+ ·10	− ·06
2·65	2·68	2·52	..	..	..	..	..	2·32	17·0	2·71	2·65	2·63		− ·06	− ·08
2·65	2·68	2·51	..	..	..	..	..	2·20	16·8	2·68	2·65	2·67		− ·03	− ·01
2·68	2·63	2·52	..	..	..	..	..	2·38	16·9	2·70	2·67	2·59		− ·03	− ·11
2·62	2·83	2·54	..	..	..	..	..	2·17	16·8	2·68	2·65	2·72		− ·03	+ ·04
2·75	2·73	2·38	..	..	..	..	..	1·93	16·3	2·60	2·75	2·73		+ ·15	+ ·13
2·87	2·72	2·40	..	..	..	..	..	1·99	16·6	2·65	2·85	2·71		+ ·20	+ ·06
2·69	2·53	2·36	..	..	..	..	..	2·18	15·7	2·59	2·69	2·49		+ ·10	− ·10
2·53	2·53	2·29	..	..	..	..	..	2·04	15·4	2·54	2·53	2·53		− ·01	− ·01
2·61	2·37	2·42	..	..	..	..	..	2·47	15·5	2·57	2·60	2·41		+ ·03	− ·16
2·67	2·32	2·37	..	..	..	..	..	2·42	15·5	2·56	2·66	2·48		+ ·10	− ·08
2·73	2·38	2·33	..	..	..	..	..	2·28	15·7	2·60	2·72	2·62		+ ·12	+ ·02
2·70	2·41	2·36	..	..	..	..	..	2·31	15·6	2·59	2·69	2·49		+ ·10	− ·10
2·54	2·56	2·52	..	..	..	..	..	2·48	15·9	2·64	2·54	2·54		− ·10	− ·10
2·62	2·54	2·35	..	..	..	..	..	2·15	15·6	2·58	2·62	2·46		+ ·04	− ·12
·34	·51	·25	..	..	..	..	..	·55	1·7	·19	·32	·32		·30	·29
2·68	2·57	2·42	..	..	..	..	..	2·24	16·2	2·63	2·67	2·59		+ ·04	− ·04
2·68	2·57	2·42	..	..	..	..	..	2·21	16·1	2·62	2·68	..		+ ·06	..
·00	·00	·00	..	..	..	..	..	+ ·03	+ ·1	+ ·01	− ·01	..		− ·02	..

Not observed.

Digitized by Google

SUBSURFACE AND MEAN VELO-

Soláni Right Aqueduct—

[*Instruments*—1⅛″ *Double-Floats*,

N.B.—The Actual Depth (H) on the vertical of Experiment is 0·3 of a foot

Serial No.	1 Date, 1876-77.	2 Depth. Actual. H	Depth. Variation.	Length of Rod. l	3 Fall of Water-Surface. Upper 3 miles. F_1	Lower 4½ miles. F_2	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Subsurface past the cen- [Each Velocity is the Nominal 0	1	2	3
Series 29.	21-3-'76	8·48	+·05	8	5·72	5·03	190	..	0	..	0	H	2·31	2·78	2·59	2·68
	„ „	·50	·00	8	5·80	5·05	„	..	0	..	0	W	2·31	2·88	2·68	2·83
	25-3- „	·48	·00	8	5·77	5·03	?	..	0	SSW	5	H	2·34	2·54	2·68	2·54
	„ „	·48	·00	8	„	„	?	SSW	5	SSW	5	W	2·59	2·78	2·68	2·68
	24-3- „	·47	+·07	8	5·73	5·02	?	..	0	SSW	14	W	2·34	2·63	2·68	2·54
	22-3- „	·45	·00	8	5·80	5·00	?	..	0	..	0	H	2·27	2·88	2·31	2·88
	„ „	·45	·00	8	„	„	?	..	0	..	0	W	2·46	2·54	2·68	2·59
	23-3- „	·41	+·03	8	5·79	4·96	?	..	0	S	12	H	2·46	2·54	2·54	2·63
	20-3- „	·33	+·05	8	5·77	4·93	?	SW	5	S	10	H	2·31	2·27	2·63	2·68
	„ „	·38	+·05	8	5·87	4·98	?	S	10	..	0	W	2·05	2·73	2·59	2·73
	27-3- „	·35	+·10	8	5·90	4·95	?	..	0	..	0	W	2·50	2·68	2·27	2·78
	28-3- „	·35	·00	8	5·85	4·95	?	..	0	N	15	H	2·24	2·50	2·31	2·59
	29-3- „	·30	·00	8	5·80	4·80	?	..	0	..	0	W	2·08	2·34	2·42	2·42
	„ „	·30	·00	8	„	„	?	..	0	..	0	H	2·42	2·50	2·63	2·54
	27-3- „	·28	+·05	8	5·82	4·88	?	..	0	..	0	H	2·31	2·42	2·73	2·63
	17-3- „	·28	·00	8	5·82	4·83	?	..	0	SW	14	W	2·50	2·59	2·83	2·54
δ	Range,	·22	..	0	·18	·25	?	..	..	..	..	..	·54	·61	·56	·46
v	Means of 16,	8·39	..	8	5·80	4·95	?	SSW 2				..	2·34	2·60	2·58	2·64
v'		Parabolic, (v')			..	..		..	..	..	..	..	2·39	2·51	2·60	2·66
Δ		Discrepancies ($v - v'$)			..	..		..	..	..	..	..	−·05	+·09	−·02	−·02
Series 30.	27-3-'77	7·07	−·01	7	5·83	4·02	Not observed.	NW	4	V	1	P	2·46	2·61	2·70	2·86
	„ „	·06	·00	7	5·84	4·01		V	1	V	1	W	2·42	2·70	2·75	2·75
	26-3- „	6·87	·00	7	5·88	3·87		V	1	V	1	W	2·50	2·63	2·78	2·86
	„ „	·89	+·03	7	5·86	3·89		V	1	NE	1	P	2·50	2·86	2·63	2·78
	„ „	·90	·00	7	5·90	3·90		NE	4	NW	4	W	2·24	2·94	2·70	2·80
δ	Range,	·20	..	0	·07	·15	..	..	..	..	..	..	·26	·33	·15	·11
v	Means of 5,	6·96	..	7	5·86	3·94	..	N 1				..	2·42	2·75	2·71	2·81
v'		Parabolic, (v')			..	..		..	..	..	..	..	2·46	2·65	2·77	2·83
Δ		Discrepancies, ($v - v'$)			..	..		..	..	..	..	..	−·04	+·10	−·06	−·02

Digitized by Google

CITIES PAST A VERTICAL. TABLE XX.

NON-CENTRAL VERTICAL.

and 1″ tin Tube-Rods].

less than the central depth shown by the Gauge, *see Plate* XVI.

6								7	8				9		
VELOCITIES vertical of Experiment. mean of three observations]. Depths (z).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.				DIFFERENCES		
									Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials.				
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	v		$(v_{\frac{1}{2}H} - U)$.	$(v - U)$.	
2·73	2·83	2·68	2·78	2·46	..	..	2·31	22·8	2·69	2·75	2·80		+·06	+·11	
2·88	2·94	3·00	2·88	2·73	..	..	2·65	24·1	2·84	2·90	2·88		+·06	+·04	
2·68	2·83	2·68	2·50	2·68	..	..	2·77	22·2	2·62	2·72	2·88		+·10	+·26	
2·63	2·88	2·73	2·73	2·50	..	..	2·39	23·0	2·71	2·69	2·88		−·02	+·17	
2·54	2·83	2·59	2·68	2·50	..	..	2·42	22·2	2·62	2·61	2·80		−·01	+·18	
2·78	3·06	2·78	2·83	2·46	..	..	2.29	22·1	2·61	2·84	2·80		+·23	+·19	
2·68	2·63	2·46	2·88	2·42	..	..	2·21	22·1	2·61	2·67	2·88		+·06	+·27	
2·78	2·73	2·59	3·00	2·42	..	..	2·18	22·4	2·66	2·77	2·86		+·11	+·20	
2·59	2·78	2·68	2·46	2·59	..	..	2·63	21·4	2·56	2·62	2·94		+·06	+·38	
2·50	2·63	2.59	2·59	2·54	..	..	2·52	21·9	2·61	2·52	2·68		−·09	+·07	
2·83	2·59	2·73	2·73	2·54	..	..	2·47	22·2	2·65	2·79	2·80		+·14	+·15	
2·59	2·38	2·68	2·68	2·46	..	..	2·38	21·0	2·51	2·55	2·73		+·04	+·22	
2·59	2·73	2·59	2·88	2·50	..	..	2·39	21·2	2·55	2·61	2·80		+·06	+·25	
2·68	2·63	2·73	2·63	2·54	..	..	2·51	21·5	2·59	2·67	2·83		+·08	+·24	
2·68	2·68	2·68	2·59	2·46	..	..	2·42	21·4	2·59	2·68	2·75		+·09	+·16	
2·83	2·73	2·68	2·68	2·54	..	..	2·50	22·0	2·66	2·82	2·65		+·16	−·01	
·38	·68	·54	·54	·31	..	..	·59	3·1	·33	·38	·29		·32	·39	
2·69	2·68	2·62	2·72	2·52	..	..	2·44	22·1	2·63	2·70	2·81		+·07	+·18	
2·69	2·70	2·67	2·62	2·54	..	..	2·50	21·9	2·61	2·70	..		+·09	..	
·00	−·02	−·05	+·10	−·02	..	..	−·06	+·2	+·02	·00	..		−·02	..	
2·89	2·75	2·68	2·46	..	..	..	2·44	19·2	2·71	2·88	2·73		+·17	+·02	
2·80	2·78	2·61	2·68	..	..	..	2·68	19·2	2·71	2·77	2·96		+·06	+·25	
2·78	2·70	2·63	2·17	..	..	..	2·17	18·4	2·68	2·82	2·93		+·14	+·25	
2·91	2·86	2·56	2·65	..	..	..	2·65	19·1	2·77	2·84	2·97		+·07	+·20	
2·63	2·86	2·80	2·75	..	..	..	2·75	19·4	2·80	2·72	3·00		−·08	+·20	
·28	·16	·24	·58	..	..	..	·58	1·0	·12	·16	·27		·25	·23	
2·80	2·79	2·66	2·54	..	..	..	2·54	19·0	2·73	2·81	2·92		+·08	+·19	
2·83	2·76	2·64	2·46	..	..	..	2·46	18·9	2·71	2·83	..		+·12	..	
−·03	+·03	+·02	+·08	..	..	..	+·08	+·1	+·02	−·02	..		−·04	..	

4 1′ 7⅛ LEFT OF CENTRE, *i. e.*, 7½″ from Left Bank.

Digitized by Google

SUBSURFACE AND MEAN VELO-

Soláni Right Aqueduct—

[*Instruments* { *Nos.* 31 *and* 32. $1\frac{5}{8}$″ *Double-Floats*, *No.* 32. 3″ *Double-Floats*,

Serial No.	1	2			3			4				5				
	Date, 1876.	Depth.			Fall of Water-Surface.			Wind.				Timekeeper's Initial.	Subsurface- past the ver- [Each Velocity is the Nominal			
		Actual.	Variation.	Length of Rod.	Upper 5 miles.	Lower 4½ miles.	Local Slope.	From		To						
		H		l	F_1	F_2	S	Direction.	Velocity.	Direction.	Velocity.		0	1	2	3
Series 31.	1-3-'76	8·58	·00	8	5·82	4·73	?	..	0	..	0	W	2·65	2·97	3·06	2·88
	„ „	·58	·00	8	5·77	„	?	..	0	..	0	H	2·83	3·00	2·97	2·97
	„ „	·58	·00	8	„	„	?	..	0	..	0	W	2·94	3·09	2·97	3·03
	„ „	·58	·00	8	„	„	?	..	0	..	0	H	2·91	2·73	2·91	2·88
	8-3 „	·43	·00	8	5·77	4·43	190	..	0	..	0	W	2·70	2·80	3·06	2·94
	„ „	·43	·00	8	„	„	„	..	0	..	0	H	2·59	2·97	2·83	2·91
	„ „	·43	·00	8	„	„	„	..	0	..	0	W	2·70	2·78	2·88	3·06
	„ „	·43	·00	8	„	„	„	..	0	S	7	H	2·88	2·78	3·03	2·80
	2-3 „	·40	·00	8	5·80	4·60	?	..	0	..	0	W	2·56	2·94	2·94	2·80
	„ „	·40	·00	8	„	„	?	..	0	..	0	H	2·80	2·75	2·75	2·78
	„ „	·40	+ ·03	8	„	„	?	..	0	..	0	W	2·65	2·94	2·78	3·00
	„ „	·43	+ ·03	8	5·82	4·63	?	..	0	..	0	H	2·50	2·86	2·80	2·88
	„ „	·45	·00	8	5·80	4·65	?	..	0	..	0	W	2·59	2·97	3·06	3·06
	6-3 „	·35	·00	8	5·75	4·55	?	..	0	..	0	H	2·80	2·75	3·06	2·86
	„ „	·35	·00	8	„	„	?	..	0	..	0	W	2·70	3·03	3·13	3·03
	„ „	·35	·00	8	5·85	„	?	..	0	..	0	H	2·73	2·83	3·13	2·97
δ	Range,	·23	..	0	·10	·30	?	..	..	..	..	..	·44	·36	·38	·28
v	Means of 16.	8·45	..	8	5·79	4·59	?		S l			..	2·72	2·89	2·96	2·93
v'		Parabolic, (v')											2·74	2·85	2·94	2·99
Δ		Discrepancies, ($v - v'$)											−·02	+·04	+·02	−·06
Series 32.	8-2-'76	8·75	.00	8	5·85	4·75	?	..	0	..	0	W	3·13	3·30	3·23	3·33
	„ „	·75	·00	8	„	„	?	..	0	..	0	H	3·00	3·23	3·45	3·26
	23-2- „	·65	·00	8	5·75	4·75	?	..	0	..	0	W	3·33	3·50	3·49	3·33
	„ „	·65	·00	8	„	„	?	..	0	..	0	H	2·91	3·23	3·30	3·49
	„ „	·65	·00	8	5·85	„	?	..	0	..	0	W	3·26	3·19	3·45	3·41
	„ „	·65	·00	8	„	„	?	..	0	..	0	H	3·06	3·09	3·19	3·45
	„ „	·65	·00	8	„	„	?	..	0	..	0	W	3·37	3·30	3·37	3·53
	29-2- „	·65	·00	8	5·80	4·75	?	..	0	..	0	W	3·00	3·19	3·41	3·61
	„ „	·65	·00	8	„	„	?	..	0	..	0	H	2·97	3·06	3·13	3·45
	26-2- „	·60	·00	8	5·80	4·70	190	..	0	..	0	H	2·88	3·00	3·26	3·41
	„ „	·60	·00	8	„	„	„	..	0	..	0	W	3·19	2·97	3·26	3·19
	„ „	·60	·00	8	„	„	„	..	0	..	0	H	2·83	3·06	2·19	3·49
	„ „	·60	·00	8	„	„	„	..	0	..	0	W	3·00	3·19	3·49	3·49
	28-2- „	·60	·00	8	5·80	4·70	?	S	4	S	4	H	3·06	3·41	3·13	3·30
	„ „	·60	·00	8	„	„	?	S	4	..	0	W	2·97	3·49	3·45	3·45
	„ „	·60	·00	8	„	„	?	..	0	..	0	H	3·13	3·45	3·26	3·41
δ	Range,	·15	..	0	·10	·05	?	..	..	..	..	..	·54	·52	·36	·42
v	Means of 16,	8·64	..	8	5·81	4·73	?		S l			..	3·07	3·22	3·32	3·41
v'		Parabolic, (v')											3·07	3·22	3·32	3·38
Δ		Discrepancies, ($v - v'$)											·00	·00	·00	+·03

Digitized by Google

CITIES PAST A VERTICAL. TABLE XXI.

NON-CENTRAL VERTICALS.

and 1″ tin Tube-Rods, except on 8-2-'76. }].
and 1″ wood Rods on 8-2-'76. }

6								7	8			9		
VELOCITIES tical of Experiment. mean of three observations]. Depths (z).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations. Discharge. Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials	DIFFERENCES ($v_{\frac{1}{2}H} - U$).	($u - U$).	
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	u			
3·06	2·97	2·97	2·80	2·63	..	..	2·53	24·8	2·89	3·03	3·06	+·14	+·17	
3·13	3·03	3·16	3·06	2·73	..	..	2·54	25·6	2·99	3·10	3·11	+·11	+·12	
3·03	3·19	2·86	2·91	2·88	..	..	2·86	25·8	3·01	3·08	3·13	+·07	+·12	
2·88	2·80	3·16	2·86	2·68	..	..	2·58	24·4	2·84	2·86	2·90	+·02	+·06	
2·91	3·03	3·03	2·86	2·70	..	..	2·63	24·5	2·90	2·94	2·93	+·04	+·03	
3·00	2·91	2·94	3·00	2·38	..	..	2·11	24·2	2·87	2·98	3·00	+·11	+·13	
3·03	3·09	3·06	2·94	2·65	..	..	2·53	24·7	2·93	3·04	3·01	+·11	+·08	
3·00	2·97	2·97	2·91	2·70	..	..	2·61	24·3	2·88	2·99	3·06	+·11	+·18	
3·09	2·97	2·80	2·54	2·65	..	..	2·69	23·7	2·82	3·07	2·94	+·25	+·12	
2·94	2·86	2·80	2·94	2·73	..	..	2·65	23·7	2·82	2·92	2·86	+·10	+·04	
3·03	3·00	3·00	2·83	2·75	..	..	2·72	24·5	2·91	3·02	2·78	+·11	−·13	
2·97	3·19	2·88	3·00	2·91	..	..	2·87	24·7	2·93	3·02	2·99	+·09	+·06	
2·88	3·00	2·97	3·03	2·83	..	..	2·74	25·1	2·97	2·91	2·99	−·06	+·02	
3·13	3·13	3·03	3·06	2·65	..	..	2·51	24·6	2·95	3·13	2·80	+·18	−·15	
2·91	3·13	2·86	3·09	2·78	..	..	2·67	25·1	3·00	2·95	2·93	−·05	−·07	
2·94	2·91	2·88	2·88	2·63	..	..	2·54	24·1	2·89	2·93	2·97	+·04	+·08	
·25	·39	·36	·55	·53	..	..	·76	2·1	·20	·27	·35	·31	·33	
3·00	3·01	2·96	2·92	2·71	..	..	2·61	24·6	2·91	3·00	2·97	+·09	+·06	41¼ LEFT OF CENTRE.
3·01	3·00	2·95	2·88	2·77	..	..	2·71	24·6	2·91	3·01	..	+·10	..	
−·01	+·01	+·01	+·04	−·06	..	..	−·10	·0	·00	−·01	..	−·01	..	
3·26	3·23	3·41	3·26	3·13	..	..	3·03	28·5	3·26	3·25	3·53	−·01	+·27	
3·33	3·26	3·16	3·19	3·06	..	..	2·96	28·2	3·22	3·30	3·35	+·08	−·13	
3·53	3·41	3·37	3·13	3·06	..	..	3·01	28·6	3·31	3·49	3·17	+·18	−·14	
3·41	3·30	3·37	3·19	3·06	..	..	2·98	28·3	3·27	3·37	3·30	+·10	+·03	
3·30	3·33	3·41	3·26	3·06	..	..	2·93	28·4	3·29	3·31	3·43	+·02	+·14	
3·37	3·37	3·37	3·33	3·00	..	..	2·79	28·2	3·26	3·37	3·24	+·11	−·02	
3·53	3·23	3·26	3·06	3·13	..	..	3·18	28·5	3·29	3·43	3·41	+·14	+·12	
3·45	3·53	3·37	3·33	3·19	..	..	3·10	29·2	3·37	3·48	3·35	+·11	−·02	
3·30	3·37	3·19	3·06	3·13	..	..	3·18	27·8	3·21	3·32	3·31	+·11	+·10	
3·23	3·30	3·19	3·09	2·94	..	..	2·85	27·2	3·16	3·25	3·31	+·09	+·15	
3·37	3·23	3·45	3·13	2·94	..	..	2·83	28·5	3·32	3·33	3·41	+·01	+·09	
3·23	3·30	3·19	2·97	3·00	..	..	3·02	27·3	3·17	3·25	3·45	+·08	+·28	
3·45	3·33	3·33	3·09	3·09	..	..	3·09	28·2	3·28	3·41	3·41	+·13	+·13	
3·37	3·45	3·41	3·26	3·03	..	..	2·89	28·3	3·29	3·39	3·30	+·10	+·01	
3·45	3·57	3·49	3·26	3·13	..	..	3·05	29·2	3·39	3·49	3·47	+·10	+·08	
3·41	3·49	3·41	3·41	3·09	..	..	2·90	28·9	3·37	3·43	3·43	+·06	+·06	
·30	·34	·33	·44	·25	..	..	·39	2·0	·23	·24	·36	·17	·42	
3·37	3·36	3·34	3·19	3·07	..	..	2·99	28·3	3·28	3·37	3·37	+·09	+·09	40′ LEFT OF CENTRE. see also Series 38.
3·40	3·38	3·31	3·20	3·06	..	..	2·94	28·3	3·27	3·40	..	+·13	..	
−·03	−·02	+·03	−·01	+·01	..	..	+·05	·0	+·01	−·03	..	−·04	..	

Digitized by Google

SUBSURFACE AND MEAN VELO-

SOLÁNÍ RIGHT AQUEDUCT—

[*Instruments* { *No.* 33. 1½" *Double-Floats,*
{ *No.* 34. 3" *Double-Floats,*

Serial No.	Date, 1876-78.	1	2 DEPTH. Actual. H	Variation.	Length of Rod. l	3 FALL of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_2	Local Slope. S	4 WIND. From Direction.	Velocity.	To Direction.	Velocity.	5 Timekeeper's Initial.	SUBSURFACE-VELOCITIES past the ver- [Each Velocity is the Nominal 0	1	2	3
Series 33.	27-3-'78		8·70	·00	8	5·85	4·67	190	W	4	S	18	G	3·09	3·66	3·45	3·61
	28-3- „		·70	·00	8	5·90	4·70	?356	N ẟ W	4	V	*l*	P	3·26	3·09	3·45	3·37
	„ „		·70	·00	8	„	„	„	V	*l*	..	0	G	3·45	3·33	3·45	3·49
	23-2-'76		·68	+ ·05	8	5·82	4·78	?	SW	6	S	15	H	3·09	3·26	3·45	3·41
	29-2- „		·65	·00	8	5·85	4·75	?	..	0	S	5	W	3·09	3·26	3·13	3·19
	„ „		·65	·00	8	„	„	?	S	5	S	12	H	2·88	3·13	3·33	3·19
	25-3-'78		·63	·00	8	5·87	4·63	190	W	6	NW	3	G	3·41	3·53	3·45	3·45
	„ „		·63	·00	8	„	„	„	NW	3	..	0	P	3·41	3·41	3·80	3·45
	„ „		·63	·00	8	„	„	193	..	0	..	0	G	3·41	3·45	3·57	3·57
	26-3- „		·62	·00	8	5·88	4·62	193	..	0	S	6	P	3·37	3·49	3·57	3·53
	28-2-'76		·60	·00	8	5·80	4·70	?	..	0	S	5	W	3·06	3·41	3·49	3·33
	„ „		·60	·00	8	„	„	?	S	5	SW	14	H	3·00	3·23	3·16	3·53
	18-4-'78		·53	·00	8	5·87	4·53	200	..	0	..	0	P	2·75	3·00	3·16	3·23
	„ „		·52	− ·03	8	5·88	4·52	„	..	0	V	*l*	R	2·94	3·26	3·41	3·37
	„ „		·50	·00	8	5·90	4·50	„	V	*l*	..	0	P	3·19	3·33	3·53	3·66
	„ „		·50	·00	8	„	„	„	..	0	V	*l*	R	2·91	3·45	3·49	3·49
ẟ	Range,		·20	..	0	·10	·28	?166	..	..	..	..	..	·70	·66	·67	·47
v	Means of 16,		8·62	..	8	5·86	4·64	?224	SSW 3				..	3·14	3·33	3·43	3·43
v'			Parabolic, (*v'*) ..			..	..	..	..	..	..	..	..	3·15	3·29	3·39	3·46
Δ			Discrepancies, (*v* − *v'*) ..			..	..	..	..	..	..	..	..	− ·01	+ ·04	+ ·04	− ·03
Series 34.	10-1-'76		9·53	+ ·05	9	5·77	5·33	Not observed.	S	14	S	15	W	3·37	3·66	3·97	3·87
	„ „		·55	·00	9	5·75	5·35		S	15	S	21	H	3·66	3·61	3·95	3·73
	11-1- „		·45	·00	9	5·75	5·25		V	8	SE	8	W	3·55	3·73	3·92	4·00
	„ „		·45	·00	9	5·80	„		SE	8	S	15	H	3·41	3·70	3·75	3·70
	14-1- „		·43	·00	9	5·77	5·23		..	0	N	9	H	3·49	3·77	3·80	3·95
	„ „		·43	·00	9	„	„		N	9	S	20	W	3·53	3·97	3·90	3·97
	7-1- „		40	·00	9	5·80	5·30		..	0	NE	8	H	3·75	3·70	3·90	3·82
	12-1- „		·40	·00	9	5·80	5·20		..	0	..	0	W	3·70	3·90	3·82	3·82
	„ „		·40	·00	9	„	„		V	*l*	S ẟ W	8	H	3·53	3·75	3·92	3·82
	„ „		·40	·00	9	„	„		S ẟ W	8	S ẟ W	19	W	3·64	3·77	3·68	3·90
	15-1- „		·40	·00	9	5·80	5·20		..	0	..	0	H	3·51	3·64	3·61	3·68
	„ „		·40	·00	9	„	„		..	0	V	4	W	3·47	3·75	3·87	3·97
	„ „		·40	·00	9	„	„		V	4	N	17	H	3·37	3·64	3·85	3·77
	17-1- „		·40	·00	9	5·80	5·20		..	0	..	0	W	3·55	3·75	3·80	3·92
	6-1- „		·35	·00	9	5·85	5·25		V	*l*	V	*l*	H	3·26	3·64	3·87	3·90
	„ „		·35	·00	9	„	„		V	*l*	V	*l*	W	3·49	3·70	3·85	3·85
ẟ	Range,		·20	..	0	·10	·15	..	..	..	..	..	..	·49	·36	·36	·32
v	Means of 16,		9·42	..	9	5·80	5·24	..	S 4				..	3·52	3·73	3·84	3·85
v'			Parabolic, (*v'*) ..			..	..	..	..	..	..	..	..	3·55	3·70	3·81	3·86
Δ			Discrepancies, (*v* − *v'*) ..			..	..	..	..	..	..	..	..	− ·03	+ ·03	+ ·03	− ·01

Digitized by Google

CITIES PAST A VERTICAL. TABLE XXII.

NON-CENTRAL VERTICALS.

and 1″ Rods of wood in 1876, *of tin in* 1878.]]
and 1″ wood Rods. }]

6								7	8			9		
VELOCITIES tical of Experiment. mean of three observations]. Depths (z).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES		
									Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials			
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	u	$(v_{\frac{1}{2}H} - U)$.	$(u - U)$.	
3·49	3·49	3·41	3·53	3·37	..	..	3·26	30·4	3·50	3·49	3·49	−·01	−·01	40′ LEFT OF CENTRE. see also Series 32.
3·33	3·57	3·49	3·49	3·45	..	..	3·42	29·5	3·39	3·41	3·43	+·02	+·04	
3·61	3·45	3·49	3·41	3·33	..	..	3·27	29·8	3·43	3·55	3·57	+·12	+·14	
3·33	3·33	3·37	3·26	3·06	..	..	2·92	28·5	3·29	3·33	3·41	+·04	+·12	
3·53	3·23	3·30	3·49	3·37	..	..	3·29	28·5	3·30	3·43	3·37	+·13	+·07	
3·26	3·13	3·06	3·23	3·03	..	..	2·90	27·2	3·15	3·22	3·14	+·07	−·01	
3·53	3·53	3·41	3·57	3·61	..	..	3·64	30·3	3·51	3·53	3·55	+·02	+·04	
3·23	3·33	3·66	3·66	3·66	..	..	3·66	30·3	3·51	3·26	3·47	−·25	−·04	
3·45	3·90	3·53	3·66	3·41	..	..	3·25	30·9	3·57	3·59	3·33	+·02	−·24	
3·33	3·41	3·37	3·13	3·70	..	..	4·05	29·7	3·44	3·35	3·35	−·09	−·09	
3·49	3·37	3·33	3·23	3·19	..	..	3·17	28·7	3·33	3·45	3·41	+·12	+·08	
3·41	3·41	3·49	3·33	3·26	..	..	3·22	28·7	3·34	3·41	3·33	+·07	−·01	
3·41	3·53	3·57	3·33	3·37	..	..	3·39	28·0	3·29	3·44	3·53	+·15	+·24	
3·53	3·49	3·41	3·41	3·26	..	..	3·18	28·7	3·37	3·52	3·43	+·15	+·06	
3·49	3·66	3·49	3 53	3·19	..	..	3·02	29·6	3·48	3·53	3·57	+·05	+·09	
3·57	3·49	3·37	3·57	3·23	..	..	3·06	29·3	3·44	3·55	3·39	+·11	−·05	
·38	·77	·60	·53	·67	..	..	1·15	3·7	·42	·37	·43	·40	·48	
3·44	3·45	3·42	3·43	3·34	..	..	3·29	29·3	3·40	3·44	3·42	+·04	+·02	
3·49	3·49	3·45	3·37	3·26	..	..	3·17	29·1	3·38	3·49	..	+·11	..	
−·05	−·04	−·03	+·06	+·08	..	..	+·12	+·2	+·02	−·05	..	−·07	..	
3·70	3·75	3·66	3·57	3·47	3·19	..	3·04	34·6	3·64	3·74	3·65	+·10	+·01	37½ LEFT OF CENTRE.
3·75	4·17	3·85	3·66	3·49	3·51	..	3·52	35·8	3·75	4·08	3·65	+·33	−·10	
3·85	3·68	3·70	3·55	3·43	3·16	..	3·04	34·6	3 66	3·73	3·69	+·07	+·03	
3·61	3·77	3·64	3·75	3·53	3·45	..	3·41	34·5	3·65	3·73	3·68	+·08	+·03	
4·05	4·00	3 68	3·55	3·33	3·30	..	3·29	35·0	3·71	4·01	3·61	+·30	−·10	
3·85	3·75	3·64	3·57	3·37	3·23	..	3·17	34·8	3 69	3·78	3·74	+·09	+·05	
4·00	3·85	3·92	3·64	3·49	3·13	..	2·99	35·0	3·72	3·89	3·77	+·17	+·05	
3·68	3·92	3·66	3·75	3·41	3·39	..	3·38	34·9	3·72	3·85	3·68	+·13	−·04	
3·73	3·75	3 68	3·49	3·33	3·26	..	3·23	34·2	3·64	3·74	3·67	+·10	+·03	
3·82	3·85	3·87	3·77	3·45	3·19	..	3·09	34·8	3·70	3·84	3·71	+·14	+·01	
3·80	3·70	3·77	3·64	3·33	3·30	..	3·29	33·9	3·61	3·73	3·65	+·12	+·04	
3·97	3·70	3·64	3·51	3·43	3·14	..	3·02	34·4	3 66	3·78	3·66	+·12	·00	
4·11	3·75	3·64	3·66	3·28	3·41	..	3·46	34·6	3·68	3·86	3·51	+·18	−·17	
3·92	3·82	3·64	3·57	3·39	3·19	..	3·11	34·5	3·67	3·85	3·71	+·18	+·04	
4·05	3·97	3·57	3·61	3·57	3·37	..	3·30	34·8	3·72	4·00	3·73	+·28	+·01	
3·80	3·70	3·85	3·53	3·66	3·23	..	3·08	34·4	3·68	3·73	3·77	+·05	+·09	
·50	·49	·35	·28	·38	·38	..	·53	1·9	·14	·35	·26	·28	·26	
3·86	3·82	3·71	3·61	3·44	3·28	..	3·21	34·7	3·68	3·83	3·68	+·15	·00	
3·87	3·83	3·75	3·61	3·43	3·21	..	3·10	34·6	3·67	3·35	..	+·18	..	
−·01	−·01	−·04	·00	+·01	+·07	..	+·11	+·1	+·01	−·02	..	−·03	..	

Digitized by Google

SUBSURFACE AND MEAN VELO-

Soláni Right Aqueduct—

[*Instruments—3″ Double-Floats,*

Serial No.	1 Date, 1876.	2 Depth. Actual. H	2 Depth. Variation.	2 Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	3 Fall of Water-Surface. Lower 4½ miles. F_2	3 Fall of Water-Surface. Local Slope. S	4 Wind. From. Direction.	4 Wind. From. Velocity.	4 Wind. To. Direction.	4 Wind. To. Velocity.	5 Timekeeper's Initial.	Subsurface past the ver- [Each Velocity is the Nominal. 0	1	2	3
Series 35.	18-1-'76	9·63	−·05	9	5·77	5·43	?	S ♁ W	6	NW	10	W	4·03	4·22	4·41	4·08
	„ „	·60	·00	9	5·75	5·40	?	NW	10	SW	14	H	4·20	4·22	4·29	4·26
	„ „	·58	−·05	9	5·77	5·38	?	SW	14	SW	18	W	4·11	4·20	4·35	4·20
	8-5- „	·40	+·06	9	5·85	5·25	205	..	0	..	0	H	4·29	4·39	4·48	4·32
♁	Range,	·23	..	0	·10	·18	?	..	..	..	..	..	·26	·09	·19	·24
v	Means of 4,	9·55	..	9	5·79	5·37	?	WSW 7				..	4·16	4·23	4·38	4·22
v′	Parabolic, (*v*)				..	..		..	..	..	..	..	4·18	4·24	4·28	4·28
△	Discrepancies, (*v* − *v*)				..	..		..	..	..	..	..	−·02	−·01	+·10	−·06
Series 36.	19-1-'76	9·43	·00	9	5·82	5·23	?	..	0	SW	5	H	3·90	4·20	4·26	4·35
	„ „	·42	−·03	9	5·78	5·22	?	SW	5	SW	9	W	4·17	4·22	4·29	4·17
	„ „	·40	·00	9	5·80	5·20	?	SW	9	S	10	H	4·14	4·38	4·20	4·38
	17-1- „	·40	·00	9	5·80	5·20	?	..	0	..	0	H	4·11	4·20	4·32	4·29
	„ „	·40	·00	9	„	„	?	..	0	S	9	W	4·20	4·26	4·20	4·22
	„ „	·40	·00	9	„	„	?	S	9	S ♁ W	14	H	3·90	4·17	4·26	4·08
	5-5- „	·30	·00	9	5·85	5·25	205	..	0	..	0	W	4·22	4·38	4·38	4·35
	„ „	·30	·00	9	„	„	„	..	0	..	0	H	4·05	4·22	4·22	4·58
	6-5- „	·30	·00	9	5·85	5·20	205	..	0	..	0	W	4·20	4·61	4·48	4·29
	„ „	·30	·00	9	„	„	190	..	0	..	0	H	4·35	4·29	4·55	4·41
	22-1- „	·30	·00	9	5·80	5·20	?	V	*l*	V	*l*	W	4·26	4·22	4·22	4·11
	„ „	·29	−·02	9	5·81	5·19	?	V	*l*	V	*l*	H	4·32	4·11	4·17	4·17
	„ „	28	·00	9	5·82	5·18	?	V	8	S	20	W	3·92	4·14	4·29	4·26
	24-1- „	·25	·00	9	5·75	5·15	?	..	0	SW	5	H	4·08	4·00	4·11	4·05
	„ „	·25	·00	9	5·80	„	?	SW	5	NW	21	W	4·14	4·05	4·08	4·17
♁	Range,	·18	..	0	·10	·10	?	..	..	..	..	..	·45	·61	·47	·53
v	Means of 15,	9·33	..	9	5·81	5·20	?	SW ♁ S 3				..	4·13	4·23	4·27	4·26
v′	Parabolic, (*v′*)				..	..		..	..	..	..	..	4·16	4·21	4·23	4·23
△	Discrepancies, (*v* − *v′*)				..	..		..	..	..	..	..	−·03	+·02	+·04	+·03

Digitized by Google

TABLE XXIII.

CITIES PAST A VERTICAL.

NON-CENTRAL VERTICAL,

and 1" wood Rods].

6								7	8			9	
VELOCITIES tical of Experiment. mean of three observations]. Depths (ε).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
									Discharge / Depth	Mid-depth Velocity.	Rod Velocity [Mean of 6 trials		
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{4}H}$	u	$(v_{\frac{1}{4}H} - U)$.	$(u - U)$.
4·38	4·00	4·08	3·87	4·05	3·70	..	3·48	39·3	4·08	4·07	3·70	−·01	−·38
4·22	4·14	4·20	4·03	3·73	3·75	..	3·76	39·3	4·09	4·16	3·97	+·07	−·12
4·14	4·05	3·97	3·73	3·75	3·47	..	3·31	38·2	3·99	4·07	3·85	+·08	−·14
4·41	4·22	4·32	4·06	4·11	3·92	..	3·84	39·9	4·24	4·28	4·15	+·04	−·19
·27	·22	·35	·33	·38	·45	..	·53	1·7	·25	·21	·45	·09	·29
4·29	4·10	4·14	3·92	3·91	3·71	..	3·60	39·2	4·10	4·15	3·92	+·05	−·18
4·25	4·19	4·10	3·99	3·84	3·66	..	3·55	39·1	4·09	4·21	..	+·12	..
+·04	−·09	+·04	−·07	+·07	+·05	..	+·05	+·1	+·01	−·06	..	−·07	..
4·03	4·17	4·05	3·82	3·55	3·55	..	3·55	37·7	3·99	4·13	3·85	+·14	−·14
4·14	4·05	3·92	3·82	3·64	3·68	..	3·70	37·7	4·01	4·08	3·86	+·07	−·15
4·20	3·95	3·90	3·75	3·64	3·64	..	3·64	37·7	4·01	4·02	4·05	+·01	+·04
4·05	4·17	3·95	3·85	3·64	3·49	..	3·43	37·7	4·01	4·13	3·87	+·12	−·14
4·32	3·97	3·92	3·68	3·68	3·57	..	3·53	37·6	4·00	4·07	3·87	+·07	−·13
4·22	4·00	3·92	3·87	3·66	3·66	..	3·66	37·5	3·99	4·07	3·92	+·08	−·07
4·20	4·22	4·20	3·90	3·92	3·82	..	3·79	38·7	4·16	4·21	4·12	+·05	−·04
4·29	4·35	4·48	4·03	4·08	4·20	..	4·24	39·5	4·25	4·33	4·24	+·08	−·01
4·58	4·26	4·14	4·00	3·87	3·87	..	3·87	39·5	4·25	4·37	4·04	+·12	−·21
4·29	4·29	4·35	4·00	4·26	3·95	..	3·86	39·7	4·27	4·29	4·12	+·02	−·15
3·97	3·85	3·90	3·85	3·59	3·43	..	3·38	36·6	3·93	3·89	3·85	−·04	−·08
4·05	4·03	4·03	3·64	3·55	3·61	..	3·63	36·7	3·95	4·04	3·92	+·09	−·03
4·08	3·87	4·08	3·80	3·75	3·70	..	3·69	37·1	3·99	3·95	3·87	−·04	−·12
3·95	3·85	3·80	3·68	3·59	3·73	..	3·77	35·8	3·87	3·89	3·79	+·02	−·08
3·97	4·14	3·92	3·97	3·70	3·59	..	3·56	36·8	3·97	4·08	3·88	+·11	−·09
·63	·50	·58	·39	·71	·77	..	·86	3·9	·40	·48	·45	·18	·25
4·15	4·08	4·04	3·84	3·74	3·70	..	3·69	37·8	4·04	4·10	3·95	+·06	−·09
4·19	4·12	4·02	3·90	3·74	3·56	..	3·49	37·7	4·04	4·15	..	+·11	..
−·04	−·04	+·02	−·06	·00	+·14	..	+·20	+·1	·00	−·05	..	−·05	..

30' LEFT OF CENTRE.
see also Series 37.

Digitized by Google

SUBSURFACE AND MEAN VELO-

SOLAS. ROBERT AITKENHEAD—

Instruments—1" Double-Float.

Serial No.	Date, 1874.	1 Depth. Assumed.	1 Depth. Verification.	1 Length of Wire.	2 Fall of Water-surface. Direct observation.	2 Fall of Water-surface. Slope of Hillside.	2 Fall of Water-surface. Assumed Mean.	3 Wind. From. Direction.	3 Wind. From. Velocity.	3 Wind. To. Direction.	3 Wind. To. Velocity.	4 Time of Immersion.	5 Subsurface past the Ship. Ship Velocity in the Nominal. 1	5 Subsurface past the Ship. Ship Velocity in the Nominal. 1	5 Subsurface past the Ship. Ship Velocity in the Nominal. 2	5 Subsurface past the Ship. Ship Velocity in the Nominal. 3
		F		L	F_1	F_2	S									
Series 87.	27-1-'74	3·15	·01	3	3·10	3·10		--	0	--		E	+·03	+·03	4·22	4·11
	" "	·15	·01	3	3·15	"		--	0	--		E	+·14	+·22	4·22	4·14
	" "	·15	·01	3	"	"		--	0	--		E	+·03	+·03	4·00	3·95
	" "	·15	·01	3	"	"		S	1	S		E	+·08	+·08	3·90	4·08
	28-1- "	·15	·01	3	3·15	3·15		--	0	SW		E	+·11	+·17	4·06	3·92
	" "	·15	·01	3	3·15	"		SW	5	--		E	+·14	+·14	+·11	4·26
	" "	·15	·01	3	"	"		--	0	--		E	+·28	+·08	4·06	4·08
	" "	·15	·01	3	"	"		--	0	S		E	+·00	+·08	4·05	3·95
	23-1- "	·13	·01	3	3·10	4·30		--	0	--		E	+·14	+·22	4·11	4·20
	" "	·13	·01	3	3·87	"		--	0	--		E	+·14	+·22	4·44	4·05
	" "	·13	·01	3	"	"		--	0	SW		E	+·17	+·17	4·20	4·22
	" "	·13	·01	3	"	"		SW	7	SW		E	+·20	+·28	4·29	4·17
	27-1- "	3·15	·01	3	3·15	4·25		--	0	--		E	+·28	+·22	4·03	4·08
	" "	·15	·01	3	3·95	"		--	0	--		E	+·20	+·08	4·17	4·05
	" "	·15	·01	3	"	"		--	0	--		E	+·08	+·08	4·20	3·97
	" "	·15	·01	3	"	"		--	0	--		E	+·03	+·14	4·20	4·05
	1-2- "	·30	·01	3	3·30	4·30		--	0	--		E	3·95	4·20	4·08	4·14
	" "	·30	·01	3	3·25	"		--	0	S		E	4·00	4·17	4·05	4·38
	l Range,	·15	..	6	·12	·15	..	--	--	--	--	--	·34	·29	·54	·46
	v Means of 9,	3·97	..	9	3·34	4·28	..	S 5 W 3				--	4·12	4·15	4·14	4·10
	v'	Parabolic, (*v'*)			..	..	..	..	..	..	..	..	4·11	4·14	4·14	4·11
	Δ	Discrepancies, (*v* − *v'*)			..	..	..	..	..	..	..	..	−·01	+·01	·00	−·01
Series 88.	16-2-'74	3·10	·01	9	3·05	3·10		--	0	--		E	3·70	3·73	3·77	3·75
	" "	·10	·01	9	"	"		--	0	--		W	3·70	3·87	3·70	3·92
	" "	·10	·01	9	"	"		--	0	--		E	3·80	3·70	3·61	3·80
	" "	·10	·01	9	"	"		--	0	--		W	3·46	3·81	3·70	3·77
	2-2- "	·15	·01	9	3·15	3·15		W	10	S	8	E	3·81	3·92	4·00	4·08
	" "	·15	·01	9	3·05	"		S	8	S	8	W	3·81	4·00	4·03	4·03
	17-2- "	·15	·01	9	3·15	3·05		--	0	--		E	3·37	3·73	3·70	3·85
	" "	·15	+·05	9	3·92	3·05		--	0	--		W	3·53	3·47	3·90	3·77
	" "	·20	·00	9	3·90	3·10		--	0	--		E	3·49	3·64	3·85	3·85
	" "	·23	+·05	9	3·87	3·13		--	0	S	6	W	3·57	3·59	3·70	3·80
	" "	·25	·00	9	3·85	3·15		S	8	S	9	E	3·57	3·73	3·75	3·73
	" "	·28	+·05	9	3·82	3·18		S	9	S	11	W	3·43	3·80	4·00	3·82
	l Range,	·18	..	6	·30	·13	..	--	--	--	--	--	·55	·53	·42	·35
	v Means of 12,	9·17	..	9	3·84	3·12	..	S 4				--	3·63	3·75	3·81	3·85
	v'	Parabolic, (*v'*)			..	..	..	..	..	..	..	..	3·63	3·75	3·83	3·87
	Δ	Discrepancies, (*v* − *v'*)			..	..	..	..	..	..	..	..	·00	·00	−·02	−·02

Digitized by Google

CITIES PAST A VERTICAL. **TABLE XXIV.**

NON-CENTRAL VERTICALS.

and 1″ wood Rods].

6								7	8			9		
VELOCITIES vertical of Experiment. mean of three observations]. Depths (z).							Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES		
									Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials			
4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{4}H}$	u	$(v_{\frac{1}{4}H} - U)$.	$(u - U)$.	
4·05	4·08	3·66	3·87	3·68	3·45	..	3·44	35·7	3·95	4·07	3·69	+·12	−·26	30′ LEFT OF CENTRE. see also Series 35, 36.
4·38	4·08	3·87	3·85	3·68	3·53	..	3·52	36·6	4·04	4·22	3·67	+·18	−·37	
4·11	4·05	3·53	3·64	3·66	3·59	..	3·59	35·1	3·88	4·08	3·68	+·20	−·20	
3·97	3·87	3·77	3·73	3·64	3·47	..	3·46	35·0	3·87	3·92	3·69	+·05	−·18	
4·00	3·90	3·95	4·05	3·68	3·61	..	3·61	35·8	3·96	3·95	3·71	−·01	−·25	
4·05	4·00	3·92	3·61	3·80	3·66	..	3·65	35·9	3·97	4·02	3·65	+·05	−·32	
4·11	4·14	4·05	3·80	3·68	3·66	..	3·66	36·1	3·99	4·13	3·86	+·14	−·13	
4·08	3·92	3·66	3·80	3·61	3·66	..	3·66	35·2	3·89	4·00	3·74	+·11	−·15	
4·08	4·14	4·03	3·59	3·73	3·68	..	3·68	36·1	3·99	4·11	3·68	+·12	−·31	
3·97	4·03	3·95	3·82	3·77	3·64	..	3·64	36·4	4·03	4·00	3·79	−·03	−·24	
4·14	4·35	3·85	3·82	3·68	3·66	..	3·66	36·5	4·04	4·25	3·92	+·21	−·12	
4·11	3·95	4·00	3·80	3·61	3·55	..	3·55	36·2	4·01	4·03	3·83	+·02	−·18	
4·00	4·00	3·82	3·64	3·70	3·57	..	3·57	35·2	3·93	4·00	3·74	+·07	−·19	
4·11	3·85	3·75	3·70	3·55	3·51	..	3·51	35·0	3·91	3·99	3·74	+·08	−·17	
4·08	3·90	3·92	3·82	3·64	3·55	..	3·55	35·3	3·94	3·99	3·81	+·05	−·13	
3·92	3·87	3·95	3·73	3·64	3·51	..	3·51	35·1	3·92	3·90	3·90	−·02	−·02	
4·03	3·95	3·80	3·75	3·85	3·53	..	3·53	35·2	3·96	3·99	3·63	+·03	−·33	
4·00	3·85	3·87	3·55	3·59	3·66	..	3·66	34·8	3·91	3·93	3·85	+·02	−·06	
·46	·50	·52	·50	·30	·23	..	·24	1·8	·17	·35	·29	·24	·35	
4·07	4·00	3·85	3·75	3·68	3·58	..	3·58	35·6	3·96	4·03	3·75	+·07	−·21	
4·06	3·98	3·89	3·77	3·62	3·46	..	3·46	35·6	3·95	4·02	..	+·07	..	
+·01	+·02	−·04	−·02	+·06	+·12	..	+·12	·0	+·01	+·01	..	·00	..	
3·90	3·70	3·77	3·53	3·59	3·41	..	3·39	33·6	3·70	3·79	3·49	+·09	−·21	30′ RIGHT OF CENTRE. see also Series 39.
3·68	3·85	3·80	3·57	3·45	3·19	..	3·16	33·6	3·69	3·77	3·68	+·08	−·01	
3·87	3·66	3·73	3·45	3·39	3·33	..	3·32	33·0	3·63	3·75	3·67	+·12	+·04	
3·85	3·87	3·75	3·70	3·45	3·41	..	3·41	33·8	3·72	3·86	3·59	+·14	−·13	
4·00	3·82	3·85	3·73	3·53	3·41	..	3·39	35·1	3·83	3·90	3·66	+·07	−·17	
4·03	3·85	4·05	3·64	3·47	3·45	..	3·45	35·2	3·85	3·93	3·71	+·08	−·14	
4·00	3·87	3·55	3·53	3·59	3·17	..	3·11	33·7	3·68	3·92	3·55	+·24	−·13	
3·80	3·77	3·80	3·66	3·59	3·21	..	3·14	33·7	3·68	3·78	3·58	+·10	−·10	
4·00	3·97	3·73	3·59	3·70	3·53	..	3·50	34·6	3·76	3·98	3·61	+·22	−·15	
3·97	3·87	3·73	3·77	3·59	3·49	..	3·47	34·4	3·73	3·91	3·64	+·18	−·09	
3·95	3·92	3·59	3·82	3·55	3·37	..	3·32	34·5	3·73	3·93	3·70	+·20	−·03	
3·87	3·87	3·80	3·47	3·35	3·28	..	3·26	34·3	3·70	3·87	3·65	+·17	−·06	
·35	·31	·50	·37	·35	·36	..	·39	2·2	·22	·23	·22	·17	·25	
3·91	3·84	3·76	3·62	3·52	3·35	..	3·33	34·1	3·73	3·87	3·63	+·14	−·10	
3·87	3·84	3·77	3·66	3·51	3·33	..	3·29	34·1	3·72	3·86	..	+·14	..	
+·04	·00	−·01	−·04	+·01	+·02	..	+·04	·0	+·01	+·01	..	·00	..	

Digitized by Google

SUBSURFACE AND MEAN VELO-

SOLÁNÍ RIGHT AQUEDUCT—

[*Instruments—3″ Double-Floats,*

Serial No.	1 Date, 1876.	2 Depth. Actual. H	Variation.	Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_2	Local Slope. s	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Subsurface-past the vertical [Each Velocity is the Nominal 0	1	2	3
Series 39.	2-2-'76	8·85	·00	9	5·85	4·95	Not observed.	..	0	..	0	H	3·80	3·95	4·00	4·05
	" "	·85	·00	9	"	"		..	0	SW	11	W	3·92	4·00	3·95	4·08
	" "	·85	·00	9	"	"		SW	11	SW	10	H	3·87	3·80	3·95	4·05
	" "	·85	·00	9	"	"		SW	10	S	19	W	4·14	3·97	4·03	3·85
δ	Range,	·00	..	0	·00	·00	..	..	...	..	...	..	·34	·20	·08	·23
v	Means of 4,	8·85	..	9	5·85	4·95	..	SW δ S 7				..	3·93	3·93	3·98	4·01
v′		Parabolic, (v′) ..			..	..		..	..	..	..	..	3·91	3·97	4·00	4·00
Δ		Discrepancies, (v − v′) ..			..	..		..	..	..	..	..	+·02	−·04	−·02	+·01
Series 40.	15-2-'76	8·80	·00	8	5·80	4·90	Not observed.	..	0	..	0	H	3·16	3·17	3·41	3·35
	" "	·80	·00	8	"	"		NW	6	..	0	W	3·19	3·35	3·41	3·41
	14-2- "	·70	·00	8	5·70	4·80		..	0	..	0	W	3·08	3·33	3·45	3·41
	" "	·70	·00	8	"	"		..	0	..	0	H	3·08	3·47	3·47	3·52
	" "	·70	·00	8	5·80	"		E	7	E	9	W	3·31	3·33	3·49	3·39
	" "	·70	·00	8	"	"		E	9	E	10	H	3·06	3·41	3·30	3·37
	" "	·70	·00	8	"	"		E	10	SE	18	W	3·14	3·37	3·39	3·35
	11-2- "	·70	·00	8	5·80	4·70		..	0	SW	6	W	3·09	3·24	3·33	3·45
	" "	·70	·00	8	"	"		SW	6	SW	12	H	3·05	3·45	3·31	3·35
	" "	·70	·00	8	"	"		SW	12	S δ W	19	W	2·97	3·39	3·33	3·37
	10-2- "	·65	·00	8	5·85	4·65		..	0	..	0	H	3·23	3·53	3·41	3·49
	" "	·65	·00	8	5·90	"		..	0	SW	5	W	3·31	3·35	3·57	3·30
	" "	·65	·00	8	"	"		SW	5	V	10	H	3·13	3·23	3·39	3·49
	12-2- "	·60	·00	8	5·80	4·65		SW	4	..	0	H	3·05	3·35	3·30	3·39
	" "	·60	·00	8	"	"		..	0	S	5	W	3·14	3·21	3·41	3·33
	" "	·60	·00	8	"	"		S	5	SW	12	H	3·06	3·31	3·30	3·37
δ	Range,	·20	..	0	·20	·25	..	..	...	..	...	..	·34	·36	·27	·22
v	Means of 16,	8·68	..	8	5·80	4·74	..	S 3				..	3·13	3·34	3·39	3·40
v′		Parabolic, (v′) ..			..	..		..	..	..	..	..	3·16	3·29	3·38	3·42
Δ		Discrepancies, (v − v′) ..			..	..		..	..	..	..	..	−·03	+·05	+·01	−·02

Digitized by Google

TABLE XXV.

CITIES PAST A VERTICAL.

NON-CENTRAL VERTICALS.

and 1″ wood Rods].

6								7	8			9		
VELOCITIES of Experiment. mean of three observations]. Depths (z).								Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
										Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials		
4	5	6	7	8	9	10		v_H	D	U	$v_{\frac{1}{2}H}$	u	$(v_{\frac{1}{2}H} - U)$.	$(u - U)$.	
3·95	3·87	3·77	3·70	3·55	3·45	..		3·45	33·9	3·83	3·92	3·66	+·09	−·17	
4·08	3·97	3·95	3·75	3·59	3·37	..		3·37	34·4	3·89	4·03	3·64	+·14	−·25	
3·95	3·95	3·92	3·57	3·68	3·53	..		3·53	33·9	3·84	3·95	3·66	+·11	−·18	
4·05	3·80	3·75	3·59	3·59	3·43	..		3·43	33·9	3·83	3·94	3·68	+·11	−·15	
·13	·17	·20	·18	·13	·16	..		·16	·5	·06	·11	·04	·05	·10	
4·01	3·90	3·85	3·65	3·60	3·45	..		3·45	34·0	3·85	3·96	3·66	+·11	−·19	30′ RIGHT OF CENTRE. *see also Series 38*
3·97	3·91	3·83	3·71	3·57	3·43	..		3·43	34·2	3·86	3·95	..	+·09	..	
+·04	−·01	+·02	−·06	+·03	+·02	..		+·02	−·2	−·01	+·01	..	+·02	..	
3·45	3·23	3·24	3·24	3·08	..	..		2·95	28·6	3·24	3·36	3·31	+·12	+·07	
3·41	3·30	3·24	3·03	2·83	..	..		2·67	28·4	3·22	3·37	3·46	+·15	+·24	
3·35	3·45	3·26	3·24	3·05	..	..		2·92	28·8	3·30	3·39	3·41	+·09	+·11	
3·39	3·24	3·45	3·26	3·14	..	..		3·06	29·1	3·35	3·34	3·35	−·01	·00	
3·45	3·41	3·35	3·06	3·03	..	..		3·01	28·7	3·30	3·44	3·41	+·14	+·11	
3·39	3·26	3·06	3·11	2·88	..	..		2·72	28·0	3·22	3·34	3·18	+·12	−·04	
3·49	3·21	3·26	3·16	3·01	..	..		2·90	28·3	3·26	3·39	3·35	+·13	+·09	
3·53	3·47	3·33	3·13	2·94	..	..		2·81	28·5	3·28	3·51	3·38	+·23	+·10	
3·51	3·28	3·23	2·91	3·08	..	..		3·20	28·3	3·25	3·43	3·31	+·18	+·06	
3·24	3·24	3·30	3·01	2·97	..	..		2·94	28·0	3·22	3·24	3·34	+·02	+·12	
3·61	3·43	3·14	3·19	2·90	..	..		2·71	28·8	3·33	3·55	3·33	+·22	·00	
3·47	3·14	3·31	3·17	3·23	..	..		2·27	28·5	3·29	3·36	3·32	+·07	+·03	
3·51	3·45	3·26	3·05	3·03	..	..		3·02	28·4	3·29	3·49	3·41	+·20	+·12	
3·33	3·43	3·39	3·09	2·96	..	..		2·88	28·1	3·27	3·36	3·47	+·09	+·20	
3·31	3·43	3·30	3·14	2·88	..	..		2·72	28·0	3·25	3·35	3·36	+·10	+·11	
3·26	3·37	3·30	3·14	3·00	..	..		2·92	28·0	3·25	3·29	3·32	+·04	+·07	
·37	·33	·39	·35	·40	..	..		·60	1·1	·13	·31	·29	·24	·28	
3·42	3·33	3·28	3·12	3·00	..	..		2·92	28·4	3·27	3·39	3·36	+·12	+·09	
3·42	3·37	3·27	3·13	2·94	..	..		2·79	28·3	3·26	3·40	..	+·14	..	
·00	−·04	+·01	−·01	+·06	..	..		+·13	+·1	+·01	−·01	..	−·02	..	37½ RIGHT OF CENTRE.

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Embankment Main Site—

[*Instruments*—1⅝" *Double-Floats*,

Serial No.	1 Date, 1877-78.	2 Depth. Above Datum. h	2 Depth. Actual. H	2 Depth. Variation.	2 Length of Rod. l	3 Fall of Water-Surface. Upper 4 miles. F_1	1 mile below Site. F_2	Lower 4½ miles. F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Subsurface past the ver- [Each Velocity Nomi- 0	1	2
																	FOR SERIES 41,
Series 42.	21-11-'77	9·74	5·74	+·01	5⅛	4·79	1·21	5·35	?	..	0	SW	9	G	3·53	3·41	3·45
	8-1- „	·62	·62	+·02	5⅛	4·71	1·19	5·30	223	..	0	W	10	P	3·37	3·33	3·26
	12-8-'78	·65	·65	·00	5⅛	5·08	1·07	5·25	218	E	10	E	12	P	3·57	3·57	3·33
	„ „	·65	·65	·00	5⅛	„	„	„	„	E	8	E	8	R	3·41	3·37	3·41
	„ „	·65	·65	·00	5⅛	„	„	„	„	E	8	E	5	P	3·37	3·53	3·49
	19-11- „	·60	·60	·00	5⅛	4·83	1·22	5·15	213	..	0	W	8	R	3·57	3·66	3·45
	„ „	·60	·60	·00	5⅛	„	1·19	5·18	„	W	8	SW	5	P	3·57	3·61	3·45
	„ „	·60	·60	·00	5⅛	„	1·17	5·20	213	SW	5	W	7	R	3·49	3·57	3·41
	18-11- „	·57	·57	·00	5⅛	4·86	1·14	5·20	205	..	0	SSE	7	P	3·57	3·49	3·49
	„ „	·57	·57	−·01	5⅛	„	„	„	„	SSE	7	SE	10	R	3·30	3·49	3·26
	„ „	·58	·58	+·03	5⅛	4·85	1·15	„	213	SE	10	SE	12	P	3·06	3·41	3·30
	13-8- „	·57	·57	+·03	5	5·16	1·07	5·17	200	E	11	E	17	R	3·33	3·49	3·49
	10-1-'77	·54	·54	−·01	5⅛	4·69	1·26	5·25	218	..	0	E	6	W	3·45	3·45	3·09
	„ „	·55	·55	+·02	5⅛	4·68	1·27	5·25	„	E	6	E	17	P	3·26	3·30	3·41
	1-12- „	·48	·48	+·01	5	4·75	1·25	5·13	?	W	5	W	5	P	3·23	3·41	3·33
	„ „	·48	·48	−·01	5	„	„	„	?	W	5	S	8	G	3·30	3·23	3·13
δ	Range,	·26	·26	..	·50	·48	·20	·22	?023	..	..	..	..	..	·51	·43	·40
v	Means of 16,	9·59	5·60	..	5·41	4·86	1·17	5·22	?213	SE δ E 3				..	3·40	3·46	3·36
v'		Parabolic, (v') ..				..	..	..	..	..	..	..	..	..	3·42	3·42	3·39
Δ		Discrepancies, ($v - v'$) ..				..	..	..	..	..	..	..	..	..	−·02	+·04	−·03
Series 43.	18-1-'77	7·80	3·80	+·01	3⅛	4·63	1·39	3·93	?	W δ S	9	W δ S	9	P	2·54	2·50	2·50
	„ „	·80	·80	·00	3⅛	„	„	„	?	W δ S	9	W δ S	18	W	2·83	2·73	2·68
	23-1- „	·79	·79	·00	3⅛	4·64	1·36	4·00	2 25	..	0	..	0	P	2·48	2·50	2·50
	18-1- „	·70	·70	·00	3⅛	4·63	1·37	3·90	2·33	W	4	..	0	W	2·75	2·73	2·50
	„ „	·69	·69	−·02	3⅛	4·64	„	3·89	„	..	0	S	7	P	2·78	2·63	2·54
	„ „	·68	·68	−·01	3⅛	4·65	„	3·88	„	S	7	S δ E	4	W	2·54	2·63	2·54
	22-1- „	·59	·59	+·01	3⅛	4·54	1·36	3·90	2 23	..	0	..	0	P	2·78	2·46	2·59
	„ „	·59	·59	·00	3⅛	„	„	„	„	..	0	S	9	W	2·59	2·59	2·50
	„ „	·58	·58	−·02	3⅛	4·55	„	3·89	„	S	9	..	0	P	2·46	2·56	2·44
	„ „	·57	·57	·00	3⅛	4·56	„	3·88	„	..	0	S	6	W	2·61	2·46	2·50
	16-1- „	·50	·50	·00	3	4·63	1·37	3·80	?	E	7	E	6	P	2·89	2·56	2·52
	„ „	·50	·50	·00	3	„	„	„	?	E	6	E	5	W	2·68	2·75	2·73
	„ „	·50	·50	·00	3	„	„	„	?	E	5	E	3	P	2·54	2·59	2·46
	„ „	·50	·50	·00	3	„	„	„	?	E	3	E	10	W	2·75	2·73	2·50
	15-1- „	·49	·49	·00	3	4·64	1·36	3·80	?	SE	9	SE	10	P	2·54	2·59	2·56
	„ „	·49	·49	+·01	3	„	„	„	?	SE	10	S	7	W	2·75	2·68	2·44
δ	Range,	·31	·31	..	·50	·11	·03	·20	?	..	..	..	..	..	·43	·29	·29
v	Means of 16,	7·61	3·61	..	3·31	4·61	1·37	3·87	?	S δ E 3				..	2·66	2·61	2·53
v'		Parabolic, (v')				..	..	..	..	..	..	..	..	..	2·66	2·62	2·52
Δ		Discrepancies, ($v - v'$)				..	..	..	..	..	..	..	..	..	·00	−·01	+·01

Digitized by Google

CITIES PAST A VERTICAL. TABLE XXVI.

NON-CENTRAL VERTICAL.

and 1″ tin Tube-Rods].

6									7	8				9	
FACE VELOCITIES tical of Experiment.								Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.				DIFFERENCES	
is the mean of three observations].										Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials			
nal Depths (z).															
3	4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	$v_{\frac{6}{10}}$	u	$(v_{\frac{1}{2}H} - U)$.	$(u - U)$.
3·30	3·19	2·94	..	..	..	..	..	2·75	18·7	3·26	3·32	3·01		+·06	−·25
3·49	3·26	3·06	..	..	..	..	..	2·94	18·4	3·28	3·45	3·00		+·17	−·28
3·16	2·91	2·88	..	..	..	..	..	2·86	18·1	3·20	3·19	2·79		−·01	−·41
3·16	3·16	3·09	..	..	..	..	..	3·04	18·3	3·25	3·20	3·06		−·05	−·19
3·19	3·41	3·41	..	..	..	..	..	3·41	19·2	3·40	3·24	3·14		−·16	−·26
3·57	3·53	3·49	..	..	..	..	..	3·47	19·8	3·54	3·55	3·23		+·01	−·31
3·49	3·41	3·33	..	..	..	..	..	3·28	19·4	3·46	3·48	3·17		+·02	−·29
3·53	3·23	3·33	..	..	..	..	..	3·39	19·2	3·42	3·51	3·23		+·09	−·19
3·66	3·33	2·83	..	..	..	..	..	2·54	18·7	3·36	3·62	3·02		+·26	−·34
3·45	3·03	2·88	..	..	..	..	..	2·79	17·9	3·22	3·41	3·05		+·19	−·17
3·23	3·16	3·09	..	..	..	..	..	3·05	18·0	3·22	3·24	2·88		+·02	−·34
3·41	3·19	3·30	..	..	..	..	..	3·36	18·8	3·38	3·43	3·05		+·05	−·33
2·97	3·33	2·70	..	..	..	..	..	2·31	17·5	3·11	2·99	2·75		−·12	−·36
3·03	3·06	3·19	..	..	..	..	..	3·26	17·8	3·21	3·11	2·86		−·10	−·35
3·03	3·19	3·06	..	..	..	..	..	3·00	17·6	3·20	3·11	2·97		−·09	−·23
3·26	3·16	3·06	..	..	..	..	..	3·01	17·4	3·18	3·23	3·01		+·05	−·17
·69	·62	·79	..	..	..	..	..	1·16	2·4	·43	·63	·48	·42	·24	
3·31	3·22	3·10	..	..	..	..	..	3·03	18·4	3·29	3·32	3·01		+·03	−·28
3·33	3·22	3·08	..	..	..	..	..	2·98	18·4	3·29	3·34	..		+·05	..
−·02	·00	+·02	..	..	..	..	..	+·05	·0	·00	−·02	..		−·02	..
2·54	..	..	..	..	..	..	..	2·51	9·6	2·51	2·50	2·49		−·01	−·02
2·31	..	..	..	..	..	..	..	2·01	9·7	2·56	2·68	2·44		+·12	−·12
2·10	..	..	..	..	..	..	..	1·78	8·9	2·34	2·50	2·34		+·16	·00
2·42	..	..	..	..	..	..	..	2·36	9·5	2·57	2·53	2·39		−·04	−·18
2·29	..	..	..	..	..	..	..	2·12	9·2	2·50	2·55	2·38		+·05	−·12
2·44	..	..	..	..	..	..	..	2·37	9·3	2·53	2·55	2·51		+·02	−·02
2·42	..	..	..	..	..	..	..	2·32	9·0	2·51	2·57	2·34		+·06	−·17
2·42	..	..	..	..	..	..	..	2·37	9·0	2·52	2·52	2·23		·00	−·29
2·36	..	..	..	..	..	..	..	2·31	8·8	2·46	2·47	2·21		+·01	−·25
2·36	..	..	..	..	..	..	..	2·28	8·8	2·45	2·49	2·30		+·04	−·15
2·36	..	..	..	..	..	..	..	2·28	8·8	2·53	2·53	2·37		·00	−·16
2·38	..	..	..	..	..	..	..	2·20	9·2	2·63	2·75	2·41		+·10	−·22
2·21	..	..	..	..	..	..	..	2·08	8·6	2·44	2·49	2·38		+·05	−·06
2·27	..	..	..	..	..	..	..	2·15	8·9	2·54	2·55	2·38		+·01	−·16
2·36	..	..	..	..	..	..	..	2·26	8·8	2·51	2·57	2·52		+·06	+·01
2·38	..	..	..	..	..	..	..	2·35	8·8	2·53	2·50	2·42		−·03	−·11
·44	..	..	..	..	..	..	..	·73	1·1	·29	·26	·31	·20	·30	
2·35	..	..	..	..	..	..	..	2·23	9·1	2·51	2·55	2·38		+·04	−·13
2·36	..	..	..	..	..	..	..	2·23	9·1	2·51	2·54	..		+·03	..
−·01	..	..	..	..	..	..	..	·00	·0	·00	+·01	..		+·01	..

SEE PAGE 56.

CENTRE OF LOWEST STEP, LEFT BANK,
i.e., 7 6′ ½ LEFT OF CENTRE.

Digitized by Google

SUBSURFACE AND MEAN VELO-

Solání Embankment Main Site—

[*Instruments*—1⅝" *Double-Floats*,

Series 44, 45, 46.—The velocity-parabola is carried down only to level of Tread of lowest Step : so that

Serial No.	1 Date, 1877-79.	2 Depth. Above Datum. h	Depth. Actual. H	Depth. Variation.	Length of Rod. l	3 Fall of Water-Surface. Upper 4 miles. F_1	1 mile below Site. F_2	Lower 4 miles. F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Sub- past the ver- [Each Velocity Nomi- 0	1	2
Series 44.	7-4-'77	8·55	8·93	−·02	8	4·58	1·24	4·68	?	N	5	SE	10	W	2·88	2·73	2·91
	6-4- „	·43	·81	·00	8	4·60	1·20	4·65	?	NE	6	NNE	5	P	2·86	2·91	2·54
	18-3- „	·40	·78	+·01	8	4·63	1·17	4·65	?	W	7	NE	12	W	2·91	2·80	2·83
	10-3- „	·35	·73	+·04	8	4·68	1·22	3·55	?	W	7	NE	9	P	2·94	2·73	3·00
	2-4-'79	·29	·65	·00	8	4·54	1·26	4·50	225	W	7	..	0	A	2·54	2·78	2·65
δ	Range,	·26	·28	..	0	·14	·09	1·13	?	..	..	..	..	..	·40	·18	·46
v	Means of 5,	8·40	8·78	..	8	4·61	1·22	4·41	?	NE *b* N 3				..	2·83	2·79	2·79
v'		Parabolic, (v'), *down to level of* 12*th Step*, ..								..	..	..		..	2·82	2·82	2·76
Δ		Discrepancies, (v−v') ..								..	..	..		..	+·01	−·03	+·03
Series 45.	5-4-'77	8·19	8·57	−·04	8	4·59	1·26	4·40	220	..	0	E	21	W	2·65	2·65	2·78
	17-3- „	·15	·53	−·03	8	4·63	1·22	4·40	220	..	0	W	18	W	2·78	2·59	2·54
	21-3- „	·12	·50	+·04	8	4·61	1·21	4·38	?	N	7	NE	11	W	2·80	2·86	2·73
	22-3- „	·09	·47	+·02	8	4·54	1·21	4·35	?	W	9	W	13	P	2·68	2·70	2·75
	„ „	·09	·47	−·02	8	„	„	„	?	W	13	W	12	W	2·68	2·75	2·73
	23-3- „	·00	·38	·00	8	4·63	1·20	4·27	?	W	6	W	5	P	2·63	2·63	2·40
δ	Range,	·19	·19	..	0	·09	·06	·13	?	..	..	..	..	..	·17	·27	·38
v	Means of 6,	8·11	8·49	..	8	4·59	1·22	4·36	?	WNW 4				..	2·70	2·70	2·66
v'		Parabolic, (v'), *down to level of* 12*th Step*, ..								..	..	..		..	2·70	2·70	2·67
Δ		Discrepancies, (v−v') ..								..	..	..		..	·00	·00	−·01
Series 46.	16-3-'77	7·92	8·30	·00	8	4·61	1·29	4·20	?	NW	12	NW	18	P	2·59	2·61	2·48
	19-3- „	·87	·25	−·03	8	4·56	1·24	4·20	?	E	7	E	25	P	2·73	2·59	2·56
	24-3- „	·82	·20	−·02	8	4·61	1·29	4·10	?	W	5	..	0	W	2·70	2·75	2·54
	„ „	·79	·17	−·05	8	4·64	„	4·07	?	..	0	W	8	P	2·56	2·61	2·61
	29-3- „	·80	·18	·00	8	4·58	1·32	4·05	210	W	7	..	0	W	2·63	2·65	2·54
	31-3- „	·80	·18	+·03	8	4·58	1·32	4·05	?	SW	5	W	14	P	2·59	2·50	2·46
	2-4- „	·74	·12	+·02	8	4·64	1·21	4·15	213	..	0	E	10	W	2·70	2·56	2·63
	„ „	·75	·13	·00	8	4·63	„	4·16	„	E	10	..	0	P	2·50	2·44	2·52
δ	Range,	·18	·18	..	0	·08	·11	·15	?	..	..	..	..	..	·23	·31	·17
v	Means of 8,	7·81	8·19	..	8	4·61	1·27	4·12	?	NNW 1				..	2·63	2·59	2·54
v'		Parabolic, (v'), *down to level of* 12*th Step*, ..								..	..	..		..	2·63	2·59	2·53
Δ		Discrepancies, (v−v') ..								..	..	..		..	·00	·00	+·01

Digitized by Google

CITIES PAST A VERTICAL. TABLE XXVII.

NON-CENTRAL VERTICAL.

and 1″ tin Tube-Rods.]

the quantities v_H, D, U, $v_{\frac{1}{2}H}$ are not computed for it, not being comparable with those of the Observation-Curve.

6								7	8				9	
SURFACE VELOCITIES tical of Experiment. is the mean of three observations.]								Bed-velocity.	DISCHARGE past the vertical.	MEAN VELOCITY past the vertical. Various Approximations.			DIFFERENCES	
nal Depths (s).										Discharge / Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials		
3	4	5	6	7	8	9	10	v_H	D	U	$v_{\frac{1}{2}H}$	s	$(v_{\frac{1}{2}H} - U)$.	$(s - U)$.
2·73	2·34	2·38	2·33	2·36	2·27	..	..	2·19	22·4	2·51	2·36	2·34	−·15	−·17
2·63	2·46	2·36	2·40	2·42	2·33	..	..	2·26	22·3	2·53	2·42	2·33	−·11	−·20
2·63	2·50	2·42	2·34	2·48	2·38	..	..	2·30	22·5	2·56	2·47	2·40	−·09	−·16
2·54	2·38	2·59	2·47	2·29	2·21	..	..	2·15	22·1	2·53	2·46	2·43	−·07	−·10
2·56	2·34	2·44	2·38	2·52	2·46	..	..	2·42	21·9	2·53	2·37	2·31	−·16	−·22
·19	·16	·23	·14	·23	·25	..	..	·27	·6	·05	·11	·12	·09	·12
2·62	2·40	2·44	2·38	2·41	2·33	..	..	2·26	22·2	2·53	2·42	2·36	−·11	−·17
2·62	2·42	..	..	..	..	..	..	..	..	..	..	..	..	..
·00	−·02	..	..	..	..	..	..	..	..	..	..	..	..	..
2·68	2·46	2·31	2·34	2·21	2·31	..	..	2·37	21·2	2·47	2·42	2·41	−·05	−·06
2·50	2·46	2·38	2·24	2·24	2·31	..	..	2·35	20·7	2·43	2·44	2·44	+·01	+·01
2·73	2·50	2·29	2·31	2·44	2·33	..	..	2·27	21·7	2·55	2·45	2·38	−·10	−·17
2·52	2·42	2·33	2·50	2·46	2·48	..	..	2·49	21·4	2·52	2·40	2·41	−·12	−·11
2·78	2·52	2·34	2·27	2·46	2·27	..	..	2·18	21·5	2·54	2·48	2·35	−·06	−·19
2·46	2·40	2·42	2·42	2·26	2·04	..	..	1·96	20·2	2·41	2·40	2·36	−·01	−·05
·32	·12	·13	·26	·25	·44	..	..	·53	1·5	·14	·08	·09	·13	·20
2·61	2·46	2·35	2·35	2·35	2·29	..	..	2·27	21·1	2·49	2·43	2·39	−·06	−·10
2·59	2·48	..	..	..	..	..	..	..	..	..	..	..	..	..
−·02	−·02	..	..	..	..	..	..	..	..	..	..	..	..	..
2·36	2·17	2·36	2·14	2·13	2·13	..	..	2·13	19·4	2·33	2·20	2·25	−·13	−·08
2·36	2·40	2·22	2·46	2·38	2·34	..	..	2·33	20·0	2·42	2·38	2·42	−·04	·00
2·44	2·42	2·34	2·36	2·31	2·11	..	..	2·09	20·0	2·43	2·41	2·33	−·02	−·10
2·36	2·46	2·17	2·29	2·59	2·29	..	..	2·24	20·0	2·43	2·43	2·29	·00	−·14
2·48	2·36	2·14	2·26	2·24	2·17	..	..	2·16	19·4	2·38	2·34	2·26	−·04	−·12
2·46	2·63	2·26	2·16	2·24	2·36	..	..	2·38	19·5	2·39	2·60	2·35	+·21	−·04
2·65	2·44	2·34	2·27	2·44	2·17	..	..	2·14	20·1	2·48	2·43	2·32	−·05	−·16
2·42	2·40	2·19	2·08	2·42	2·00	..	..	1·95	19·1	2·35	2·39	2·24	+·06	−·11
·29	·46	·22	·38	·46	·36	..	..	·43	1·0	·15	·40	·18	·34	·16
2·44	2·41	2·25	2·25	2·33	2·20	..	..	2·18	19·7	2·40	2·40	2·31	·00	−·09
2·45	..	..	..	..	..	..	..	..	..	..	..	..	..	..
−·01	..	..	..	..	..	..	..	..	..	..	..	..	..	..

6 INCHES FROM THE 4′ DROP-WALL, LEFT BANK; i.e. 74½ LEFT OF CENTRE.

Digitized by Google

SUBSURFACE AND MEAN VELOCITIES PAST A VERTICAL. **TABLE XXVIII.**

SOLÁNÍ EMBANKMENT MAIN SITE—NON-CENTRAL VERTICAL.

[*Instruments*—$1\frac{5}{8}$″ *Double-Floats, and* 1″ *tin Tube-Rods*].

Serial No.	1	2				3				4				5	6				7	8				9		
	Date, 1877.	Depth.			Length of Rod.	Fall of Water-Surface.				Wind.					Subsurface Velocities past the vertical of Experiment. [Each Velocity is the mean of three observations].			Bed-velocity.	Discharge past the vertical.	Mean Velocity past the vertical. Various Approximations.			Differences		
		Above Datum.	Actual.	Variation.		Upper 4 miles.	1 mile below Site.	Lower 4 miles.	Local Slope.	From		To			Nominal Depths (z).					Discharge ÷ Depth	Mid-depth Velocity.	Rod Velocity Mean of 6 trials			
		h	H		l	F_1	F_2	F_3	S	Direction.	Velocity.	Direction.	Velocity.	Timekeeper's Initial.	0	1	2	v_H	D	U	$v_{\frac{1}{10}H}$	u	$(v_{\frac{1}{10}H} - U)$.	$(u - U)$.	
Series 41.	10-4-'77	8·84	2·64	+·01	$2\frac{1}{2}$	4·59	1·23	4·88		W	5	SW	*l*	P	2·52	2·75	2·26	1·96	6·6	2·51	2·59	2·43	+·08	−·08	
	,, ,,	·85	·65	+·02	$2\frac{1}{2}$	4·58	,,	4·89		SW	*l*	N	9	W	2·63	2·56	2·44	2·36	6·7	2·51	2·52	2·59	+·01	+·08	
	,, ,,	·85	·65	−·01	$2\frac{1}{2}$	,,	1·22	4·90		N	9	N	8	P	2·68	2·54	2·31	2·16	6·5	2·46	2·46	2·50	·00	+·04	
	,, ,,	·85	·65	+·01	$2\frac{1}{2}$	,,	,,	,,		N	8	W	4	W	2·73	2·61	2·27	2·05	6·6	2·47	2·50	2·22	+·03	−·25	
	20-4- ,,	·75	·55	·00	$2\frac{1}{2}$	4·58	1·19	4·83		SW	5	SW	9	P	2·38	2·33	2·31	2·30	5·9	2·33	2·32	2·41	−·01	+·08	
	,, ,,	·76	·56	+·01	$2\frac{1}{2}$	4·57	,,	4·84		SW	9	SW	5	W	2·40	2·34	2·24	2·18	5·9	2·31	2·31	2·39	·00	+·08	
	,, ,,	·76	·56	−·01	$2\frac{1}{2}$	,,	,,	,,		SW	5	SW	9	P	2·61	2·56	2·22	2·03	6·2	2·43	2·46	2·22	+·03	−·21	
	,, ,,	·75	·55	+·01	$2\frac{1}{2}$	4·58	,,	4·83		SW	9	SW	7	W	2·46	2·44	2·32	2·10	6·0	2·35	2·38	2·21	+·03	−·14	
	,, ,,	·75	·55	−·01	$2\frac{1}{2}$	,,	,,	,,		SW	7	SW	7	P	2·63	2·21	2·05	1·96	5·6	2·20	2·17	2·24	−·03	+·04	
	,, ,,	·75	·55	·00	$2\frac{1}{2}$	,,	,,	,,		SW	7	SW	7	W	2·34	2·50	2·22	2·07	6·0	2·36	2·42	2·22	+·06	−·14	
	21-4- ,,	·75	·55	·00	$2\frac{1}{2}$	4·58	1·20	4·82		WSW	11	W	7	P	2·46	2·50	2·21	2·05	6·1	2·38	2·42	2·21	+·04	−·17	
	,, ,,	·75	·55	·00	$2\frac{1}{2}$	,,	,,	,,		W	7	W	8	W	2·61	2·40	2·40	2·40	6·2	2·43	2·40	2·38	−·03	−·05	
	,, ,,	·75	·55	·00	$2\frac{1}{2}$	,,	,,	,,		W	8	W	6	P	2·63	2·38	2·34	2·32	6·1	2·40	2·37	2·26	−·03	−·14	
	,, ,,	·75	·55	−·01	$2\frac{1}{2}$	,,	,,	,,		W	6	WSW	13	W	2·48	2·52	2·27	2·13	6·2	2·41	2·45	2·30	+·04	−·11	
	,, ,,	·75	·55	+·01	$2\frac{1}{2}$	,,	,,	,,		WSW	13	W	7	P	2·70	2·50	2·25	2·11	6·2	2·42	2·43	2·27	+·01	−·15	
	,, ,,	·74	·54	−·02	$2\frac{1}{2}$	4·59	,,	4·81		W	7	SW	4	W	2·34	2·44	2·55	2·61	6·3	2·47	2·47	2·24	·00	−·23	
									Not observed.																	
δ	Range,	·11	·11	,,	0	·02	·04	·09	,,	,,	...	,,	...	,,	·39	·54	·50	·65	1·1	·31	·42	·38	·11	·33	
v	Means of 16,	8·78	2·58	,,	2·50	4·58	1·20	4·84	,,	W *b* S 5				,,	2·54	2·47	2·29	2·17	6·2	2·40	2·42	2·32	+·02	−·08	
v′		Parabolic, (v') ,,				,,				,,				,,	2·54	2·47	2·29	2·14	6·2	2·40	2·43	,,	+·03	,,	
Δ		Discrepancies, $(v - v')$,,				,,				,,				,,	·00	·00	·00	+·03	·0	·00	−·01	,,	−·01	,,	

CENTRE OF 9TH STEP, LEFT BANK, *i.e.* 79′·9 LEFT OF CENTRE.

Digitized by Google

TABLES XXIX.—XXXIII.

Velocities past a Transversal.

Surface Velocities.

Solání Left Aqueduct Site, ... Series 51, 52, Tables XXIX.
Solání Right Aqueduct Site, ... Series 53 to 59, „ XXX., XXXI.
Solání Embankment Minor Sites, Series 60, „ XXXIII.

Mid-depth Velocities.

Solání Right Aqueduct Site, Series 61, 62, Table XXXII.

Bed-Velocities.

Solání Right Aqueduct Site, Series 65, 66, Table XXXII.

In these Tables each line shows a Set of various data collected *nearly at one time*. Such Sets of similar work as were done at nearly the same water-level and do not differ greatly in the velocities are grouped together into one Series.

In any one Series, the Sets done in one day follow *usually in the order of execution;* the work of different days is arranged generally by order of depth of water.

The Series are numbered from 51 to 66: those done upon the same transversal at the same Site following each other (by number) by order of depth of water.

The last two lines (marked δ, v, of each Series contain the following quantities for each Column, *viz.*—

δ, "Range" of (*i. e.*, difference between the greatest and least of) the quantities in the column.
v, Mean of the quantities in the column.

Explanation of the Columns.

Col.	Symbol.	Detail.
2	h	Average height of water-surface above datum, (in Series 60).
	H	Central depth of water.
		Variation of water-level during the Experiment.
		Depth at Solání Aqueduct Gauge, (in Series 60).
	R	Hydraulic Mean Depth.
	b	Surface-Breadth.
	l	Length of Connector of Double-Floats (in Series 61, 62, 65, 66).
3	F_1	Fall of water-surface in upper part of the Reach.
	F_2	Fall of water-surface in lower part of the Reach.
	S	Local Surface-Slope, (3 decimals, *i. e.*, ·000, to be prefixed by reader).
4		Direction (referred to the current-axis as N. S. line), and Velocity (in feet per second) of the Wind, at beginning and end of each Set.
5		Initials of the Timekeeper.
6	v_y	Velocities at surface, mid-depth, or bed, past the verticals whose distances (y) from mid-channel are specified at the head of each sub-column, each entry being the mean of 3 observations.
7	D	Discharge past the transversal (in sq. ft. per sec.), computed from the velocity-data of Col. 6.
8	U	Mean velocity past the transversal, computed as the quotient Discharge ÷ Breadth.

Digitized by Google

SURFACE VELOCITIES

Solání Left

[*Instrument*—3″

Serial No.	1	2					3			4				5				
	Date, 1875.	Depth.			Surface-Breadth.	Length of Connector.	Fall of Water-Surface.			Wind.				Timekeeper's Initial.	Surpast [Each Velocity Left of			
		Central.	Variation.	Hyd. Mean.			Upper 5 miles.	Lower 4½ miles.	Local Slope.	From		To						
		H		R	b	l	F_1	F_3	S	Direction.	Velocity.	Direction.	Velocity.		42½	39½	37½	35
Series 51.	21-1-'75	9·05	·00	7·47	83·5	..	5·75	5·00	Not observed.	SW	9	SSW	9	W	Assumed zero in computing Discharge.	Not observed.	3·30	3·53
	„ „	·05	·00	·47	·5	..	„	„		SSW	9	SW	9	R			3·30	3·57
	„ „	·05	·00	·47	·5	..	„	„		SW	9	SW	9	W			3·13	3·33
	22-1- „	·00	·00	·44	·6	..	5·75	5·00		..	0	..	0	W			3·33	3·75
	„ „	·00	·00	·44	·6	..	„	„		..	0	..	0	R			3·19	3·49
	„ „	·00	·00	·44	·6	..	„	„		..	0	..	0	R			3·49	3·75
	„ „	·00	·00	·44	·6	..	„	„		..	0	SW	5	W			2·94	3·26
	25-1- „	8·95	·00	·41	·7	..	5·75	4·85		S	1	S	1	R		2·78	3·13	3·57
	„ „	·95	·00	·41	·7	..	„	„		S	1	SW	?	R		2·78	3·19	3·41
	„ „	·95	·00	·41	·7	..	„	„		SW	?	SW	?	W		2·83	3·13	3·41
	„ „	·95	·00	·41	·7	..	„	„		SW	?	W	?	W		2·83	3·33	3·57
	23-1- „	·90	·00	·38	·7	..	5·80	4·90		..	0	..	0	W			3·26	3·66
	„ „	·90	·00	·38	·7	..	„	„		..	0	..	0	W			3·33	3·57
	„ „	·90	·00	·38	·7	..	„	„		S	11	..	0	R			3·06	3·66
	„ „	·90	·00	·38	·7	..	„	„		S	11	S ¼ W	11	R			2·94	3·66
∂ Range,		·15	..	·09	·2	..	·05	·15	..	..	..	..	..	..	?	?·05	·55	·49
v Means of 15,		8·97	..	7·42	83·7	..	5·76	4·93	..	SSW 3				..	?	?2·81	3·20	3·55
Series 52.	5-2-'75	8·90	·00	7·38	83·7	..	5·70	4·95	Not observed.	W	7	S	8	R	Assumed zero in computing Discharge.		2·78	3·19	3·57
	„ „	·90	·00	·38	·7	..	„	„		S	8	S	15	W			2·94	3·26	3·33
	„ „	·90	·00	·38	·7	..	„	„		S	15	SW	10	R			2·88	3·06	3·49
	„ „	·90	·00	·38	·7	..	„	„		SW	10	SW	12	W			2·83	3·26	3·49
	1-2- „	·80	·00	·31	·9	..	5·75	4·75		..	0	..	0	W			3·06	3·19	3·40
	„ „	·80	·00	·31	·9	..	„	„		..	0	SW	15	W			3·00	3·33	3·57
	„ „	·80	·00	·31	·9	..	„	„		SW	15	SW	15	R			2·88	3·19	3·33
	2-2- „	·80	·00	·31	·9	..	5·70	4·80		..	0	..	0	R			2·83	3·19	3·66
	„ „	·80	·00	·31	·9	..	5·75	„		..	0	..	0	W			2·78	3·13	3·57
	„ „	·80	·00	·31	·9	..	„	„		..	0	SE	5	R			2·88	3·33	3·33
	4-2- „	·80	·00	·31	·9	..	5·75	4·85		N	12	NE	10	W			2·78	3·33	3·40
	„ „	·80	·00	·31	·9	..	„	„		N	10	NE	9	R			2·94	3·19	3·40
	„ „	·80	·00	·31	·9	..	„	„		NE	9	SE	10	W			2·94	3·19	3·49
	6-2- „	·75	·00	·28	·9	..	5·75	4·80		..	0	SW	15	R			2·78	3·19	3·40
∂ Range,		·15	..	·10	·2	..	·05	·20	..	..	..	..	..	..	?	·28	·27	·33
v Means of 14,		8·83	..	7·33	83·8	..	5·73	4·84	..	SSW 3				..	?	2·88	3·22	3·46

Digitized by Google

AND DISCHARGES.

TABLE XXIX.

AQUEDUCT.

Surface-Floats].

6															7	8
FACE VELOCITIES each vertical.															SURFACE DISCHARGE in sq. feet per sec.	MEAN SURFACE VELOCITY.
is the mean of three observations].																
centre.				Centre.	Right of centre.											
32½	30	20	10		10	20	30	32½	35	37½	40	41½	41⅞	42½	D	U_o
	3·80	4·29	4·17	4·35	4·22	4·29	3·95		3·75	3·26	2·97				334·0	3·93
	3·90	4·17	4·55	4·35	4·35	3·90	3·85		3·66	3·26	2·86				328·1	3·86
	3·85	4·11	4·29	4·29	4·11	4·00	4·00		3·61	3·45	2·80				324·6	3·82
	4·22	4·35	4·29	4·22	4·29	4·35	4·17		3·85	3·57	3·00				340·0	4·00
	4·05	4·17	4·41	4·17	4·22	4·29	4·00		3·66	3·33	2·94				330·5	3·89
	4·11	4·29	4·29	4·11	4·17	4·17	4·00		3·85	3·41	2·73				332·6	3·91
	3·95	4·22	4·29	4·35	4·55	4·35	4·05		3·66	3·49	2·88				334·1	3·93
	3·90	3·95	4·35	4·29	4·17	3·90	3·95		3·33	3·06	3·06	2·34			322·6	3·80
	3·75	4·22	4·29	4·17	4·22	4·05	4·29		3·33	3·41	2·78	2·28			327·6	3·85
	3·80	4·17	4·35	4·22	4·35	4·11	3·85		3·49	3·19	2·94	2·38			327·1	3·85
	3·75	4·00	4·22	4·17	4·06	4·11	3·90		3·41	3·19	3·00	2·68			323·9	3·81
	4·00	4·17	4·48	4·29	4·29	4·17	4·11		3·75	3·41	3·06				333·5	3·92
	3·95	4·22	4·41	4·17	4·29	4·11	4·11		3·75	3·41	3·00				330·5	3·89
	3·95	4·11	4·11	4·35	4·29	4·22	3·80		3·75	3·41	2·83				317·8	3·74
	3·70	3·85	4·11	4·17	4·05	4·05	3·80		3·66	3·41	3·00				329·9	3·88
Not observed.								Not observed.				Not observed.	Not observed.	Assumed zero in computing Discharge.		
..	·52	·50	·44	·24	·50	·45	·49	..	·52	·51	·33	?·40	..	?	22·2	·26
..	3·91	4·15	4·31	4·24	4·24	4·14	3·99	..	3·63	3·35	2·92	?2·42	..	?	329·1	3·87
3·66	3·90	4·05	4·17	4·05	4·17	4·22	3·95	3·90	3·66	3·33	3·06	2·72	2·20		323·6	3·81
3·61	3·66	4·11	4·11	4·05	3·95	3·95	3·95	3·85	3·66	3·26	2·94	2·78	2·27		318·1	3·74
3·66	3·70	4·00	4·17	4·17	4·22	3·85	3·80	3·70	3·33	3·13	2·88	2·50	2·14		315·4	3·71
3·49	3·75	4·11	4·35	4·17	4·05	3·95	3·85	3·90	3·49	3·33	2·83	2·68	2·27		320·8	3·77
3·75	3·90	4·17	4·29	4·11	4·35	4·11	4·00	3·85	3·75	3·40	3·13	2·78	2·50		326·7	3·84
3·90	4·00	4·05	4·29	4·35	4·22	4·05	4·00	3·90	3·66	3·33	2·94	2·78	2·34		329·1	3·87
3·61	3·70	4·05	3·90	4·11	4·05	4·05	3·85	3·95	3·33	3·19	2·83	2·94	1·88		319·3	3·76
4·05	4·05	4·11	4·17	4·41	4·29	4·22	4·11	4·00	4·17	3·57	3·33	2·94	2·08		336·7	3·96
3·70	3·85	4·22	4·29	4·41	4·35	4·17	4·11	4·00	3·85	3·40	3·13	2·88	2·14		334·3	3·93
3·61	3·80	4·22	4·29	4·29	4·11	4·11	4·05	4·05	3·66	3·49	3·26	2·94	2·21		330·7	3·89
3·75	3·90	4·29	4·41	4·48	4·22	4·17	4·11	4·00	3·85	3·57	3·13	2·68	2·34		338·0	3·98
3·61	4·11	4·22	4·11	4·17	4·48	4·22	4·05	3·70	3·75	3·49	3·40	3·06	2·34		331·0	3·89
3·80	3·95	4·22	4·55	4·41	4·29	4·11	3·95	3·85	3·57	3·40	3·00	2·73	2·21		333·1	3·92
3·75	3·85	4·05	4·11	4·00	4·17	4·00	3·85	3·80	3·40	3·00	3·13	2·50	2·14		316·5	3·72
·56	·45	·29	·65	·48	·53	·37	·31	·35	·84	·57	·57	·56	·62	?	22·6	·27
3·71	3·87	4·13	4·23	4·23	4·21	4·08	3·97	3·89	3·65	3·35	3·07	2·78	2·22	?	327·7	3·84

Digitized by Google

SURFACE VELOCITIES

SOLÁNÍ RIGHT

[*Instrument*—3″

Serial No.	1 Date, 1875-76-78.	2 Depth. Central. H	Variation.	Hyd. Mean. R	Surface-Breadth. b	Length of Connector. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_2	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Surface past [Each Velocity Left of 42½	41⅝	41½	40
Series 53.	2-8-'78	9·95	·00	7·95	82·0	..	6·07	5·40	Not observed.	V	4	S	12	P	Assumed zero in computing Discharge.	3·00	3·53	3·92
	3-8- „	·95	·00	·95	·0	..	6·05	5·35		NNE	8	N	5	R		3·13	3·33	4·17
	„ „	·95	·00	·95	·0	..	„	„		N	5	N	8	P		3·53	3·37	3·92
	1-8- „	·91	+·01	·93	·0	..	6·06	5·41		SSE	3	V	6	P		3·19	3·49	3·90
	„ „	·93	+·04	·94	·0	..	6·04	5·43		V	6	V	5	R		3·19	3·41	4·11
	28-11- „	·89	+·03	·91	·0	..	6·01	5·49		..	0	V	7	P		3·33	3·53	3·70
	„ „	·89	−·02	·91	·0	..	„	„		V	4	..	0	R		3·68	3·03	3·39
	29-11- „	·89	−·03	·91	·0	..	6·01	5·49		E	7	E	8	P		3·19	3·33	3·61
	„ „	·89	+·03	·91	·0	..	„	„		E	8	..	0	R		3·13	3·30	3·49
	27-11- „	·90	·00	·92	·0	..	6·00	5·50		..	0	..	0	R		2·68	3·09	3·80
	„ „	·89	−·03	·91	·0	..	6·01	5·49		..	0	..	0	P		2·68	3·33	3·82
	„ „	·86	−·03	·90	·0	..	6·04	5·46		..	0	..	0	R		2·78	3·23	3·64
	26-11- „	·87	·00	·90	·0	..	6·03	5·47		..	0	V	9	P		2·68	3·49	3·92
	„ „	·87	·00	·90	·0	..	„	„		V	9	E	7	R		2·68	3·26	3·41
	„ „	·87	·00	·90	·0	..	„	„		E	7	V	11	P		2·78	3·33	3·82
	5-8- „	·82	+·01	·91	·5	..	6·18	5·27		NW	7	NW	15	R		3·19	3·80	3·90
	δ Range,	·13	..	·05	·5	..	·18	·23	..	..	..	..	..	..	?	·85	·77	·78
	ν Means of 16,	9·90	..	7·92	82·0	..	6·04	5·44	..	NE 2				..	?	2·99	3·37	3·78
54.	10-2-'75	9·15	·00	7·53	83·4	..	5·65	5·10	Not observed.	N	14	..	0	R	?o	2·20	2·72	3·13
	„ „	·15	·00	·53	·4	..	„	„		..	0	..	0	W	?o	1·92	2·63	2·88
	„ „	·15	·00	·53	·4	..	„	„		W	19	..	0	R	?o	2·14	2·63	3·00
	19-2-'76	8·95	+·08	·41	·7	..	5·75	5·00		SW	4	NW	15	H	?o	?	?	3·03
	δ Range,	·20	..	·12	·3	..	·10	·10	..	..	..	..	..	..	?	?·28	·09	·25
	ν Means of 4,	9·10	..	7·50	83·4	..	5·68	5·08	..	NW 5		W 5		..	?	?2·09	?2·66	3·01
55.	18-2-'76	8·78	+·05	7·30	83·9	..	5·92	4·88	?	..	0	SSW	25	W	?o	?	?	3·09
Series 56.	11-2-'75	8·80	·00	7·31	83·9	..	5·80	4·80	Not observed.	..	0	..	0	W	Assumed zero in computing Discharge.	2·08	2·46	2·94
	„ „	·80	·00	·31	·9	..	„	„		S	10	..	0	R		2·14	2·46	2·88
	8-2- „	·75	·00	·28	·9	..	5·75	4·75		..	0	..	0	W		2·27	2·78	2·83
	„ „	·75	·00	·28	·9	..	„	„		..	0	..	0	R		1·78	2·50	2·78
	„ „	·75	·00	·28	·9	..	„	„		..	0	..	0	W		2·34	2·46	2·83
	9-2- „	·75	·00	·28	·9	..	5·75	4·75		..	0	..	0	R		1·97	2·72	3·13
	„ „	·75	·00	·28	·9	..	„	„		..	0	..	0	W		1·92	2·59	2·94
	„ „	·75	·00	·28	·9	..	„	„		..	0	..	0	R		1·92	2·88	3·00
	„ „	·75	·00	·28	·9	..	„	„		..	0	SW	5	W		2·03	2·54	2·94
	12-2- „	·65	·00	·21	84·0	..	5·75	4·65		..	0	..	0	W		2·08	2·54	2·88
	„ „	·65	·00	·21	·0	..	„	„		SW	8	..	0	R		2·03	2·59	3·19
	„ „	·65	?	·21	·0	..	„	„		S	23	SW	8	W		2·34	2·54	2·94
	13-2- „	·65	·00	·21	·0	..	5·65	4·65		..	0	..	0	R		1·92	2·67	2·83
	„ „	·65	·00	·21	·0	..	„	„		..	0	..	0	W		2·03	2·50	2·94
	„ „	·65	·00	·21	·0	..	„	„		..	0	..	0	R		2·03	2·38	2·94
	„ „	·65	·00	·21	·0	..	„	„		..	0	..	0	W		2·03	2·73	2·88
	δ Range,	·15	..	·10	·1	..	·15	·15	..	..	..	..	..	..	?	·56	·50	·41
	ν Means of 16,	8·71	..	7·25	83·9	..	5·73	4·71	..	SSW 2				..	?	2·06	2·58	2·93

Digitized by Google

AND DISCHARGES.

TABLE XXX.

AQUEDUCT.

Surface-Floats].

6															7	8
FACE VELOCITIES each vertical.															SURFACE DISCHARGE in sq. feet per sec.	MEAN SURFACE VELOCITY.
is the mean of three observations].																
centre.						Centre.	Right of centre.									
37½	35	32½	30	20	10		10	20	30	32½	35	37½	39½	42½	D	U_o
3·95	4·38	4·55	4·69	4·69	4·61	4·84	4·44	4·41	4·08	3·87	3·75	3·51			367·7	4·33
4·35	4·55	4·69	5·00	5·00	5·13	5·08	4·84	4·88	4·05	4·00	3·61	3·57			390·2	4·59
4·32	4·38	4·84	4·88	5·00	5·00	5·13	4·84	4·88	4·32	4·05	3·82	3·41			391·5	4·61
4·22	4·48	4·41	4·92	4·69	5·17	5·00	4·76	4·44	4·41	4·05	3·90	3·57			377·7	4·44
4·29	4·61	4·76	4·65	5·17	4·92	5·00	4·92	4·84	4·48	4·11	3·85	3·41			391·1	4·60
4·08	4·17	4·38	4·58	4·84	4·61	4·61	4·44	4·22	3·87	3·77	3·61	3·53			360·6	4·24
3·80	4·48	4·41	4·72	4·55	4·65	4·51	4·35	4·22	3·77	3·66	3·66	3·41			352·1	4·14
4·08	4·44	4·22	4·32	4·48	4·55	4·38	4·26	4·08	3·90	3·75	3·68	3·30			346·0	4·07
3·97	4·05	4·41	4·35	4·51	4·55	4·41	4·32	4·22	4·00	3·64	3·43	3·33			483·3	4·10
4·11	4·17	4·38	4·65	5·00	4·72	4·76	4·58	4·26	4·11	3·75	3·61	3·33			366·7	4·31
4·41	4·48	4·76	4·58	4·80	5·00	4·72	4·48	4·22	3·97	3·97	3·51	3·45			366·0	4·31
4·29	4·61	4·55	4·48	4·76	4·72	4·35	4·44	4·17	3·95	3·90	3·66	3·26			354·8	4·17
3·77	4·41	4·44	4·69	4·61	4·41	4·80	4·51	4·32	4·08	4·00	3·53	3·61			363·0	4·27
4·29	4·29	4·44	4·61	4·76	5·00	4·80	4·48	4·26	4·00	3·66	3·53	3·26			363·6	4·28
4·08	4·26	4·38	4·69	4·44	4·26	4·76	4·51	4·22	3·87	3·73	3·64	3·37			355·9	4·19
4·35	4·55	4·84	4·92	5·26	5·36	5·00	4·69	4·55	4·35	3·90	3·70	3·61			389·5	4·58
·64	·56	·62	·68	·82	1·10	·78	·66	·80	·71	·47	·47	·35	..	?	45·5	·54
4·15	4·39	4·53	4·67	4·79	4·79	4·76	4·55	4·39	4·08	3·86	3·66	3·43	..	?	367·8	4·33
3·49	3·85	4·00	4·29	4·29	4·22	4·22	4·48	4·05	3·66	3·61	3·40	3·40	2·42	?0	330·1	3·88
3·33	3·75	3·85	4·11	4·22	4·29	4·35	4·17	4·11	3·80	3·75	3·49	3·26	2·63	?0	330·2	3·89
3·19	3·41	3·95	4·05	4·22	4·00	4·22	4·29	4·29	3·85	3·66	3·41	3·26	2·63	?0	329·1	3·87
3·39	3·51	3·95	4·11	4·14	4·14	3·97	4·20	4·22	4·05	3·49	3·24	3·13	2·65	?0	325·2	3·83
·30	·44	·15	·24	·15	·29	·38	·31	·24	·39	·26	·25	·27	·23	?	5·0	·06
3·35	3·63	3·94	4·14	4·22	4·16	4·19	4·29	4·17	3·84	3·63	3·39	3·26	2·58	?	328·7	3·87
3·82	3·64	3·97	4·05	4·05	4·11	4·05	4·17	4·05	3·59	3·26	3·16	3·01	2·59	?0	320·9	3·78
3·19	3·75	3·90	4·00	4·05	4·22	4·29	4·11	4·17	3·90	3·70	3·49	3·06	2·88		326·1	3·84
3·26	3·40	3·80	3·95	4·00	4·05	4·22	4·29	3·90	3·85	3·40	3·49	3·13	2·42		317·5	3·74
3·19	3·57	4·11	4·11	4·22	4·11	4·22	4·35	4·29	3·90	3·57	3·13	3·06	2·78		329·6	3·88
3·26	3·75	3·95	4·05	4·17	4·17	4·69	4·41	4·35	4·05	3·80	3·19	3·19	2·78		339·7	4·00
3·26	3·49	4·00	4·05	4·17	4·11	4·48	4·22	4·00	3·75	3·61	3·40	3·19	2·78		328·2	3·86
3·26	3·75	4·11	4·22	4·00	4·17	4·17	4·29	4·29	3·95	3·80	3·33	3·26	2·63		328·4	3·86
3·33	3·75	3·95	4·11	4·29	4·11	4·41	4·17	4·11	3·80	3·80	3·66	3·19	2·63		332·4	3·91
3·40	3·66	4·00	3·90	4·17	4·11	4·11	4·17	4·29	3·80	3·70	3·49	3·06	2·83		327·2	3·85
3·33	3·57	3·90	3·90	4·22	4·41	4·17	4·00	4·22	3·90	3·66	3·49	3·33	2·59		327·8	3·86
3·33	3·49	3·70	3·90	3·90	4·00	3·90	4·22	4·00	3·80	3·57	3·49	3·33	2·88		313·1	3·68
3·33	3·57	3·70	3·75	3·85	3·66	4·05	4·05	3·95	3·61	3·45	3·49	2·88	2·73		308·2	3·63
3·26	3·66	3·57	3·85	3·70	3·80	4·17	4·05	3·80	3·57	3·37	3·13	2·88	2·59		306·3	3·60
3·13	3·49	4·05	4·05	4·22	4·17	4·00	4·05	4·00	3·61	3·57	3·33	3·13	2·88		319·3	3·76
3·40	3·49	3·61	4·05	3·90	3·90	3·95	4·05	4·11	3·66	3·61	3·57	3·26	2·88		309·9	3·65
3·26	3·57	3·95	3·95	3·90	4·11	4·29	4·22	4·11	3·61	3·53	3·49	3·26	2·94		321·8	3·79
3·40	3·49	3·85	3·95	3·80	3·95	3·95	4·05	3·95	3·85	3·70	3·49	3·06	2·88		312·1	3·67
·27	·35	·54	·47	·59	·75	·79	·41	·55	·48	·43	·53	·45	·52	?	33·4	·40
3·29	3·59	3·89	3·99	4·04	4·08	4·19	4·17	4·09	3·79	3·62	3·42	3·14	2·76	?	321·7	3·79

Not observed. Assumed zero in computing Discharge.

Digitized by Google

SURFACE VELOCITIES

Solání Right

[*Instrument*—3″

Serial No.	Date, 1875-78-79.	1	2					3			4				5				
			Depth.					Fall of Water-Surface.			Wind.					Sub-past [Each Velocity Left of			
			Central.	Variation.	Hyd. Mean.	Surface-Breadth.	Length of Connector.	Upper 5 miles.	Lower 4½ miles.	Local Slope.	From Direction.	From Velocity.	To Direction.	To Velocity.	Timekeeper's Initial.		42½	41½	41½	40
			H		R	*b*	*l*	F_1	F_3	S									
Series 57.	8-11-'78	8·62	·00	7·19	84·0	..	6·13	4·60	230	..	0	V	*g*	R	Assumed zero in computing Discharge.		2·42	3·13	3·23
	„ „	·62	·00	·19	·0	..	„	„	233	V	*g*	NW	10	P			2·50	3·00	3·24
	4-11- „	·60	·00	·18	·0	..	6·15	4·55	213	..	0	S	*l*	P			3·13	3·33	3·51
	„ „	·60	·00	·18	·0	..	„	„	223	S	*l*	..	0	R			2·94	2·68	3·57
	„ „	·60	·00	·18	·0	..	„	„	233	..	0	..	0	P			3·33	2·83	3·41
	5-11- „	·60	·00	·18	·0	..	6·15	4·60	223	..	0	..	0	R			2·88	3·00	3·49
	„ „	·60	·00	·18	·0	..	„	„	225	W	8	..	0	P			2·50	3·03	3·35
	14-12-'75	·55	+·10	·15	·1	..	6·15	4·75		..	0	S	5	W			2·78	3·06	3·26
	13-12- „	·55	·00	·15	·1	..	5·95	4·85		..	0	V	*l*	H			2·88	3·13	3·19
	„ „	·53	−·05	·13	·1	..	5·97	4·83	Not observed.	V	*l*	V	*l*	W			2·50	3·00	3·41
	„ „	·50	·00	·11	·1	..	6·00	4·80		V	*l*	..	0	H			2·27	3·00	3·57
	„ „	·50	·00	·11	·1	..	„	„		..	0	..	0	W			3·00	3·06	3·37
	14-12- „	·50	·00	·11	·1	..	5·95	4·70		..	0	..	0	H			2·42	3·00	3·49
	„ „	·50	·00	·11	·1	..	6·20	„		..	0	..	0	W			2·42	3·00	3·26
	„ „	·50	·00	·11	·1	..	„	„		..	0	..	0	H			2·59	3·19	3·37
	24-10-'78	·50	·00	·11	·1	..	6·50	4·30	178	..	0	..	0	R			3·80	3·49	4·17
	δ Range,	·12	..	·08	·1	..	·55	·55	?055	..	..	..	..	..	?		1·53	·81	·98
	v Means of 16,	8·55	..	7·15	84·1	..	6·12	4·66	?220	W *b* N *l*				..	?		2·77	3·06	3·43
Series 58.	2-4-'79	8·19	·00	6·91	84·3	..	5·81	4·49	195	..	0	..	0	Cl	Assumed zero in computing Discharge.		2·68	3·09	3·57
	„ „	·19	·00	·91	·3	..	„	„	203	..	0	..	0	C			2·54	2·73	3·26
	3-4- „	·15	·00	·87	·3	..	5·85	4·40	198	SW	6	V	*l*	Cl			2·63	2·88	3·30
	„ „	·16	+·01	·87	·3	..	5·84	4·41	198	V	*l*	V	*l*	C			2·38	2·78	3·23
	11-12-'75	·15	·00	·87	·3	..	6·05	4·55	?	..	0	..	0	H			2·50	2·94	3·19
	„ „	·15	·00	·87	·3	..	„	„	?	..	0	S	8	W			2·68	3·19	3·49
	„ „	·13	+·05	·86	·3	..	6·07	4·53	?	..	0	..	0	W			2·88	2·77	3·16
	„ „	·13	·00	·84	·3	..	6·00	4·50	?	..	0	..	0	H			2·27	3·13	3·33
	5-12-78	·00	+·01	·77	·4	..	6·00	4·30	195	SW *b* S	3	WSW	8	A			2·54	2·97	3·19
	15-8- „	7·96	−·06	·74	·4	..	7·24	3·96	190	..	0	SSE	5	P			3·37	3·53	3·77
	16-8- „	·95	·00	·73	·4	..	6·30	4·05	188	..	0	..	0	R			3·19	3·06	3·80
	„ „	·95	·00	·73	·4	..	„	„	„	..	0	..	0	P			3·23	3·33	3·64
	21-10- „	·93	·00	·72	·4	..	6·52	3·78	200	..	0	S	5	R			3·41	4·05	3·75
	„ „	·92	−·03	·71	·4	..	6·53	3·77	190	S	5	..	0	P			3·26	3·41	3·87
	δ Range,	·27	..	·20	·1	..	1·43	·78	?115	..	..	..	..	..	?		1·10	1·32	·71
	v Means of 14,	8·07	..	6·81	84·4	..	6·17	4·27	?195	S *b* W 1				..	?		2·83	3·13	3·47
59.	9-12-'75	7·70	?	6·56	84·5	..	?5·90	4·20	Not observed.	V	5	SE *b* E	11	H	?o	Not observed.	3·00	3·16	
	10-12- „	·50	·00	·41	·5	..	6·10	4·00		V	6	SW	10	H	?o		3·41	3·41	
	„ „	·50	·00	·41	·5	..	„	„		SW	10	V	8	W	?o		3·06	3·23	
	δ Range,	·20	..	·15	·0	..	?·20	·20	..	..	..	..	..	..	?		..	·41	·25
	v Means of 3,	7·57	..	6·46	84·5	..	?6·03	4·07	..	S *b* W 7				..	?		..	3·16	3·27

For Series 60, (at Solání Embankment

Digitized by Google

AND DISCHARGES. **TABLE XXXI.**

AQUEDUCT.

Surface-Floats].

6															7	8
FACE VELOCITIES each vertical.															SURFACE DISCHARGE in sq. feet per sec.	MEAN SURFACE VELOCITY.
is the mean of three observations].																
centre.						Centre.	Right of centre.									
37½	35	32½	30	20	10		10	20	30	32½	35	37½	39½	42½	D	U_6
3·70	3·92	4·03	4·11	4·35	4·80	4·61	4·80	4·32	4·22	4·05	3·66	3·45	3·33		354·6	4·17
3·61	4·03	4·11	4·22	4·38	4·26	4·26	4·22	4·14	4·05	3·87	3·51	3·59	3·26		342·0	4·02
4·03	4·22	4·44	4·80	4·58	4·58	4·55	4·55	4·89	4·41	4·44	4·20	3·87	3·61		375·8	4·42
3·92	4·00	4·20	4·48	4·44	4·76	4·58	4·41	4·51	4·26	4·20	4·11	4·00	3·57		364·2	4·28
3·82	4·00	4·41	4·22	4·72	4·55	4·61	4·48	4·51	4·32	4·05	3·87	3·82	3·80		367·4	4·32
3·80	4·17	4·52	4·29	4·61	4·44	4·55	4·65	4·48	4·20	4·05	3·95	3·75	3·80		363·9	4·28
3·73	4·32	4·14	4·14	4·29	4·55	4·44	4·51	4·65	4·11	4·22	4·11	3·80	3·53		357·9	4·21
3·70	3·85	4·00	4·41	4·29	4·48	4·55	4·22	4·22	3·95	3·61	3·49	3·37	3·03		344·8	4·06
3·90	3·75	4·00	4·11	4·11	4·35	4·35	4·22	4·22	4·05	3·90	3·70	3·53	3·19		340·1	4·00
3·57	3·85	4·00	4·35	4·29	4·22	4·29	4·29	4·35	4·11	4·17	3·61	3·41	3·26		344·1	4·05
3·80	3·70	4·05	4·22	4·22	4·35	4·41	4·29	4·05	4·00	3·75	3·66	3·41	3·35		339·7	4·00
4·11	3·80	4·11	4·35	4·41	4·41	4·11	4·22	4·00	3·85	3·85	3·57	3·45	3·26		338·2	3·98
3·90	3·53	4·11	4·41	4·17	4·29	4·35	4·11	4·17	3·85	3·80	3·85	3·37	3·33		339·7	4·00
3·49	3·80	4·00	4·29	4·35	4·55	4·69	4·22	4·17	3·80	3·95	3·75	3·49	3·23		347·9	4·09
3·95	3·85	4·11	4·22	4·48	4·55	4·41	4·29	4·22	3·95	3·70	3·66	3·45	3·13		347·2	4·08
4·55	4·96	5·00	5·04	5·08	5·04	5·00	4·61	4·03	3·85	3·64	3·61	3·51	3·30		379·7	4·47
1·06	1·43	1·00	·93	·97	·82	·89	·69	·89	·61	·83	·71	·63	·77	?	41·5	·49
3·85	3·98	4·19	4·35	4·42	4·51	4·49	4·38	4·31	4·06	3·95	3·77	3·58	3·37	?	352·9	4·15
3·80	4·00	3·80	4·11	3·90	4·00	4·17	3·70	4·11	3·80	3·61	3·70	3·37	3·16		327·7	3·86
3·45	3·70	3·66	3·95	4·00	4·17	3·90	4·11	3·90	3·61	3·57	3·53	3·33	3·19		318·1	3·74
3·53	3·70	3·61	3·70	4·11	3·95	3·92	3·90	3·75	3·80	3·80	3·57	3·49	3·06		317·8	3·74
3·45	3·80	3·75	4·00	4·00	4·00	3·90	3·95	3·75	3·75	3·66	3·45	3·30	3·06		315·7	3·71
3·61	3·80	4·05	4·29	4·41	4·17	4·35	4·35	4·41	3·95	3·90	3·80	3·57	3·35		347·0	4·08
3·85	4·17	4·11	4·35	4·22	4·22	4·35	4·29	4·05	3·80	3·70	3·61	3·57	3·16		339·4	3·99
3·61	3·85	4·22	4·22	4·22	4·17	4·22	4·41	4·22	4·17	4·00	3·85	3·61	3·26		340·9	4·01
3·75	4·22	4·17	4·41	4·55	4·48	4·29	4·29	4·17	4·00	4·11	3·66	3·70	3·23		348·2	4·10
3·87	4·14	4·05	4·00	4·38	4·44	4·35	4·41	4·05	3·82	3·82	3·57	3·35	3·13		341·2	4·01
4·00	4·32	4·69	4·61	4·58	4·72	4·88	4·41	4·29	3·92	4·00	3·59	3·24	3·19		366·2	4·31
4·20	4·35	4·48	4·48	4·76	4·76	4·72	4·22	4·29	4·05	3·70	3·57	3·57	3·19		365·1	4·30
4·26	4·41	4·32	4·80	4·84	4·51	4·76	4·51	4·17	3·92	3·64	3·45	3·37	3·23		364·9	4·29
4·22	4·69	4·72	4·88	4·55	4·72	4·72	4·61	4·08	3·80	3·80	3·68	3·64	3·49		364·3	4·29
4·41	4·69	4·88	4·76	4·92	4·69	4·72	4·35	4·11	3·95	3·75	3·61	3·43	3·35		368·9	4·34
·96	·99	1·27	1·18	1·02	·81	·98	·91	·66	·56	·54	·40	·46	·43	?	53·2	·63
3·86	4·13	4·18	4·33	4·39	4·36	4·38	4·25	4·09	3·88	3·79	3·62	3·47	3·22	?	345·0	4·06
3·61	4·00	3·95	4·29	3·66	3·75	3·85	4·29	4·48	4·17	3·90	3·70	3·33	3·33	?0	326·3	3·84
3·61	4·05	4·05	4·17	4·22	4·22	4·48	4·17	4·22	4·00	3·85	3·85	3·53	3·41	?0	344·4	4·05
3·70	3·85	4·22	4·29	4·00	4·05	4·17	4·11	4·05	3·90	3·85	3·57	3·41	3·19	?0	330·7	3·89
·09	·20	·27	·12	·56	·47	·63	·18	·43	·27	·05	·28	·20	·22	?	18·1	·21
3·64	3·97	4·07	4·25	3·96	4·01	4·17	4·19	4·25	4·02	3·87	3·71	3·42	3·31	?	333·8	3·93

MINOR SITES,) SEE TABLE XXXIII.

Assumed zero in computing Discharge.

Assumed zero in computing Discharge.

Digitized by Google

MID-DEPTH AND BED VELO-

Solání Right

[*Instrument*—1⅝″

N.B.—These are velocities past a transversal a little

Serial No.	Date 1876-77.	1	2				3			4				5				
			Depth.				Fall of Water-Surface.			Wind.								
										From		To						Mid-Bed past [Each Velocity Left of
			Central.	Variation.	Hyd. Mean.	Surface-Breadth.	Length of Connector.	Upper 5 miles.	Lower 4½ miles.	Local Slope.	Direction.	Velocity.	Direction.	Velocity.	Timekeeper's Initial.	42½	41⅞	41½	40
			H		R	b	l	F_1	F_2	S									
Series 61.	16-6-'77		10·10	·00	8·05	82·0	5	5·90	5·70		E	4	E	4	W	Assumed zero in computing Discharge.	Not observed.	3·35	3·70
	25-9- „		·02	·09	·00	·0	5	6·06	5·57		..	0	V	5	G			3·49	4·11
	26-9- „		·02	+·04	·00	·0	5	6·06	5·52		NNE	4	NNE	9	P			3·64	3·68
	27-9- „		·02	+·04	·00	·0	5	6·06	5·52		..	0	NNE	12	G			3·85	4·17
	28-9- „		·02	+·02	·00	·0	5	6·06	5·52		NW	4	NNE	12	P			3·73	3·97
	29-9- „		·01	−·02	·00	·0	5	6·07	5·51		NW	3	..	0	G			3·57	4·05
	2-10- „		·02	·00	·00	·0	5	6·06	5·52		ENE	4	ENE	7	P			3·85	4·11
	3-10- „		·02	·00	·00	·0	5	6·06	5·52		E	4	E b N	6	G			3·49	4·11
	4-10- „		·02	·00	·00	·0	5	6·06	5·52		E	4	V	4	P			3·77	3·82
	20-6- „		·00	+·02	7·99	·0	5	5·70	5·60	210	W	7	SE	11	P			3·41	3·61
	14-6- „ / 15-6- „		9·99	+·10	·98	·0	5	5·76	5·67	Not observed.	NNE	7	NE	19	P			3·45 / ..	3·53 / ..
	12-6- „		·98	+·04	·97	·0	5	5·72	5·63		N	5	NE	9	P			3·26	3·75
	13-8- „		·98	+·03	·97	·0	5	5·97	5·53		E	5	SW	17	W			3·53	3·68
	13-6- „		·96	+·02	·96	·0	5	5·74	5·66		NW	7	N	6	W			3·35	3·75
	18-6- „		·90	·00	·92	·0	5	5·77	5·55		NW	7	NW	4	P			3·49	3·49
	19-6- „		·86	+·02	·90	·0	5	5·84	5·51		S	9	S	12	W			3·35	3·61
	δ Range,		·24	..	·15	·0	0	·37	·19	?	..	..	..	..	..	?	..	·59	·68
	v Means of 16,		10·00	..	7·98	82·0	5	5·93	5·57	?	NE 2				..	?	..	3·54	3·82
62.	22-6-'76		9·05	·00	7·47	83·5	4½	5·80	4·70	?	S b W	9	SW	14	H	?o	?	3·30	3·70
65.	5-10-'77		10·00	·00	7·99	82·0	10	6·08	5·50	Not observed.	E b N	6	V	8	G	?o	Not observed.	3·45	3·80
	6-10- „		·00	·00	·99	·0	10	6·08	5·50		V	l	V	l	P	?o		3·43	3·57
	8-10- „		·00	·00	·99	·0	10	6·08	5·55		E	4	N	5	G	?o		3·45	3·75
	δ Range,		·00	..	·00	·0	0	·00	·05	..	..	..	..	..	..	?	..	·02	·23
	v Means of 3,		10·00	..	7·99	82·0	10	6·08	5·52	..	NE b E 4				..	?	..	3·44	3·71
Series 66.	19-2-'76		8·95	+·08	7·41	83·7	8	5·75	5·00	Not observed.	SW	4	NW	15	H	?o	Not observed.	Not observed.	2·97
	18-2- „		·78	+·05	·30	·9	8	5·92	4·88		..	0	SSW	25	W	?o			3·14
	21-2- „		·65	·00	·21	84·0	8	5·75	4·75		NE	8	V	6	W	?o			2·80
	„ „		·68	+·05	·23	·0	8	5·82	4·78		V	6	SW	20	H	?o			3·06
	δ Range,		·30	..	·20	·3	0	·17	·25	..	..	..	..	..	..	?	..	..	·34
	v Means of 4,		8·77	..	7·29	83·9	8	5·81	4·85	..	SW b W 5				..	?	..	..	2·99

Digitized by Google

CITIES AND DISCHARGES.

TABLE XXXII.

AQUEDUCT.

Double-Floats in Series 61—65. 3″ *Double-Floats in Series* 66].

above the mid-depth or bed respectively, (see Plate XXIX).

6															7	8
DEPTH VELOCITIES, SERIES 61, 62. VELOCITIES, SERIES 65, 66. each vertical. is the mean of three observations].															MID-DEPTH OR BED DISCHARGE in sq. feet per sec.	MEAN MID-DEPTH OR BED VELOCITY.
centre.						Centre.	Right of centre.									
37½	35	32½	30	20	10		10	20	30	32½	35	37½	39½	42½	D	$U_{\frac{1}{4}H}$ or U_H
4·05	4·29	4·44	4·48	4·35	4·44	4·58	4·55	4·44	4·20	4·11	3·92	3·70			359·0	4·22
4·17	4·61	4·48	4·61	4·48	4·69	4·69	4·55	4·55	4·35	4·17	4·05	3·90			369·6	4·35
4·58	4·44	4·61	4·48	4·69	4·80	4·69	4·65	4·32	4·29	4·29	4·17	4·03			371·0	4·36
4·29	4·55	4·69	4·69	4·69	4·61	4·84	4·55	4·48	4·41	4·22	4·17	3·95			377·1	4·44
4·44	4·61	4·92	4·61	4·55	4·84	4·76	4·58	4·55	4·41	4·26	4·26	4 00			376·6	4·43
4·41	4·41	4·61	4·55	4·55	4·69	4·84	4·61	4·48	4·22	4·29	4·17	3·80			373·0	4·39
4·48	4·48	4·51	4·48	4·80	4·92	4·72	4·65	4·48	4·41	4·20	4·22	4·14			377·8	4·44
4·41	4·48	4·69	4·61	4·69	4·55	4·69	4·69	4·48	4·41	4·35	4·11	4·08			374·4	4·40
4·48	4·58	4·48	4·61	4·44	4·55	4·65	4·61	4·55	4·22	4·08	4·35	3·85			369·0	4·34
4·05	4·20	4·32	4·48	4·29	4·55	4·41	4·58	4·29	4·11	4·08	4·00	3·80			352·9	4·15
4·26	4·35	4·17	4·41	4·22	4·35	4·41	..	..	..	..	..	..			348·7	4·10
..	..	..	..	..	..	..	4·44	4·22	4·08	4·14	3·80	3·64				
3·97	4·29	4·51	4·48	4·14	4·32	4·26	4·32	4·35	4·32	4·29	3·92	3·73			348·7	4·10
4·29	4·55	4 84	4·88	4 84	4·76	4·88	4·76	4·72	4·58	4·32	4·26	3·97			386·1	4·54
4·05	4·29	4·44	4·29	4·29	4·48	4·41	4·55	4·48	4·08	4·11	3·95	3·90			356·6	4·18
4·22	4·38	4·32	4·48	4·11	4·38	4·38	4·29	4·32	4·08	4·08	3·77	3·70			348·4	4·10
4·22	4·38	4·38	4·35	4·41	4·20	4·48	4·48	4·35	4·11	3·95	3·85	3·64			354·5	4·17
·51	·41	·75	·59	·73	·72	·62	·47	·50	·50	·40	·58	·50	..	?	37·7	·44
4·26	4·43	4·53	4·56	4·47	4·57	4·61	4·55	4·44	4·27	4·18	4·06	3·86	..	?	365·1	4·29
4·14	4·32	4·20	4·41	4·14	4·32	4·32	4·32	4·41	4·03	4·22	3·73	3·73	3·51	?o	350·9	4·13
4·11	4·17	4·29	4·55	4·48	4·48	4·48	4·41	4·48	4·29	4·22	3·90	3·85		?o	360·8	4·24
3·90	4·41	4·29	4·44	4·26	4·65	4·48	4·58	4·35	4·14	4·29	4·17	4·03		?o	356·6	4·20
4·11	4·29	4·22	4·48	4·41	4·48	4·55	4·41	4·22	4·17	4·00	3·90	3·80		?o	355·4	4·18
·21	·24	·07	·11	·22	·17	·07	·17	·26	·15	·29	·27	·23	..	?	5·4	·06
4·04	4·29	4·27	4·49	4·38	4·54	4·50	4·47	4·35	4·20	4·17	3·99	3·89	..	?	357·6	4·21
3·49	3·37	3·59	3·66	3·70	3·64	3·70	3·75	3·75	3·64	3·33	3·11	3·16	2·50	?o	298·2	3·51
3·31	3·43	3·68	3·51	3 73	3·85	3·57	3·85	3·70	3·55	3·24	3·35	2·83	2·78	?o	295·5	3·48
3·20	3·68	3·47	3·49	3·59	3·82	3·64	3·82	3·64	3·35	3·39	2·86	2·97	2·63	?o	291·0	3·42
3·21	3·30	3·51	3·68	3·70	3·51	3·70	3·66	3·70	3·37	3·24	3·03	3·00	2·58	?o	294·0	3·46
·29	·38	·21	·19	·14	·34	·13	·19	·11	·29	·15	·49	·33	·28	?	7·2	·09
3·30	3·45	3·56	3·59	3·68	3·71	3·65	3·77	3·70	3·48	3·30	3·09	2·99	2·62	?	294·7	3·47

Not observed. Assumed zero in computing Discharge.

Digitized by Google

TABLE XXXIII.

SURFACE VELOCITIES AND DISCHARGES.

Solání Embankment Minor Sites.

[*Instrument*—3″ *Surface-Floats*].

N.B.—This work at two Sites of very similar Cross-Section (see Plate XXVIII) combined into one series.

Serial No.	1	2					3		4		5	6																	7	8	9
		Depth.					Fall of Water-Surface.		Wind.			Surface Velocities past each vertical. *N.B.*—The Surface-Discharge is computed for 168′ breadth throughout. [Each Velocity is the mean of three observations].																			
	Date, 1875.	Above Datum.	Variation.	Central.	Solání Aqueduct Gauge.	Surface-Breadth.	Upper 5 miles.	Lower 4½ miles.	From		To	Left of centre.									Centre.	Right of centre.								Surface Discharge in cu. feet per sec.	Mean Surface Velocity.	Upper or Lower Set.
									Direction.	Velocity.	Direction.	Timekeeper's Initial.	84	82	80	78	76	68	60	40	20		20	40	60	68	76	78	80	82	84			
		h		H		*b*	F_1	F_2																					Q	U_s	
Series 60.	13-1	9·70	·00	10·28	9·00	168·7	5·70	4·90	SW	12	SE	10	W		2·22	3·19	3·45	3·75	4·05	4·35	4·55	4·35	4·35	4·41	4·17	4·05	3·90	3·61	3·33	3·06	2·34		684·6	4·08	
	14-1	·70	·00	·28	·00	·7	5·70	4·95	SW	12	..	0	W		2·27	3·26	3·57	3·85	4·11	4·55	4·61	4·05	4·55	4·29	4·41	4·22	4·05	3·85	3·53	3·16	2·28		707·9	4·21	
	„	·68	−·03	·26	8·97	·7	5·73	4·92	SW	12	W	27	R		2·50	3·53	3·90	3·90	4·41	4·35	4·17	4·29	4·22	4·11	4·23	4·17	4·00	3·80	3·53	3·28	2·27		678·2	4·04	
	15-1	·55	·00	·13	·85	167·5	5·75	4·85	NE	12	E ẟ N	8	W		2·17	3·13	3·45	3·75	4·00	4·17	4·76	4·55	4·17	4·61	4·48	4·22	4·17	4·05	3·85	3·03	2·28		701·8	4·18	
	„	·55	·00	·13	·85	·5	„	„	NE	12	s ẟ E	4	R		1·89	2·78	3·23	3·70	3·80	3·90	4·55	4·29	3·90	4·17	4·17	4·39	4·00	3·70	3·53	2·91	2·16		661·4	3·94	
	7-1	·54	·00	·17	·95	168·7	5·75	4·95	E ẟ N	½	E ẟ S	½	R		?	2·46	3·41	3·80	3·95	4·29	4·48	4·05	4·05	4·35	4·35	4·29	4·41	3·80	3·85	3·23	?		681·0	4·03	
	8-1	·54	·00	·17	·95	·7	5·70	4·95	..	0	..	0	W		2·50	3·41	3·61	3·70	3·95	4·17	4·35	4·22	4·11	4·35	4·69	4·22	3·90	3·80	3·66	3·37	2·59		671·4	4·00	
	„	·54	·00	·17	·95	·7	„	„	E	½	E	½	R		2·11	3·12	3·57	3·52	3·94	4·00	4·41	4·24	4·16	3·99	4·22	4·11	3·94	3·67	3·37	3·13	2·70		690·1	4·11	
	9-1	·54	·00	·17	·95	·7	5·75	4·95	E	18	NE	4	R		2·13	3·09	3·45	3·66	4·00	4·11	4·29	4·41	4·55	4·41	4·55	4·29	4·17	3·85	3·75	3·19	2·56		674·6	4·02	
	„	·54	·00	·17	·95	·7	„	„	E	27	E	14	W		2·33	2·97	3·57	3·85	4·05	4·05	4·17	4·17	4·35	4·05	4·29	4·22	3·95	3·66	3·53	2·86	2·22		701·0	4·17	
	∂ Range,	·16	..	·15	·15	1·2	·05	·10	..	..	..	..	..	?	?·61	1·07	·67	·38	·61	·65	·59	·50	·65	·62	·52	·24	·51	·44	·52	·51	?·54	?	46·5	·27	
	v Means of 10,	9·59	..	10·19	8·94	168·4	5·78	4·92	ESE	8			..	?	?2·24	3·09	3·52	3·75	4·08	4·19	4·48	4·27	4·24	4·25	4·36	4·21	4·05	3·78	3·61	3·11	?2·25	?	685·2	4·08	Lower. Upper.

Digitized by Google

TABLES XXXIV.—LVI.

Mean Velocities and Cubic Discharges.

Solání Left Aqueduct Site,	... Series	101 to 107,	Tables	XXXIV., XXXV.
Solání Right Aqueduct Site,	... „	108 to 127,	„	XXXVI.—XL.
Solání Right Aqueduct Site, with Left Aqueduct closed.	„	131 to 139,	„	XLI.
Solání Embankment Main Site, high water,	„	151 to 166,	„	XLII.—XLV.
Solání Embankment Main Site, low water,	„	167 to 181,	„	XLVI.—XLVIII.
Fifteenth Mile Sites { Old Site,	„	191 to 195,	„	XLIX.
Fifteenth Mile Sites { New Site,	„	196 & 197,		
Belra Site, ...	„	201 to 206,	„	L., LI.
Jaolí Site, ...	„	211 to 217,	„	LII., LIII.
Kamhera Site, ...	„	221 to 225,	„	LIV., LV.
Distributaries, ...	„	231 to 238,	„	LVI.

In these Tables each line shows a Set of various data collected *nearly at one time*. Such Sets of similar work as were done at nearly the same water-level and do not differ greatly in the velocities are grouped together into one Series.

In any one Series, the Sets done in one day follow *usually in the order of execution*; the work of different days is arranged generally by order of depth of water.

The Series are numbered from 101 to 238: those done at the same Site following each other (by number) by order of depth of water; the gaps in the numbering occur at each change of Site.

The last two lines (marked δ, v,) of each Series contain the following quantities for each Column, *viz.*—

δ, "Range" of (*i. e.*, difference between the greatest and least of) the quantities in the column.
v, Mean of the quantities in the column.

Explanation of the Columns.

Col.	Symbol.	Detail.
2	h	Average height of water-surface above Datum, or above Gauge-Zero.
	H	Central depth of water, (h = H in the Solání Aqueducts.)
		Variation of water-level during the Experiment.
		Depth at Solání Aqueduct Gauge, (only for 15th Mile and Solání Embankment Sites.)
	R	Hydraulic Mean Depth.
	b	Surface-Breadth.
	l	Length of Rod used, (at Solání Aqueduct only.)
		Date of soundings from which H, b, B, A, R, D are computed. } Only given for Earthen Channels.
	B	Wet Border. }
	A	Area of wet section. }
3	F_1	Fall of water-surface in upper part of the Reach.
	F_2	Fall of water-surface in middle part of the Reach.
	F_3	Fall of water-surface in lower part of the Reach.
	S	Local Surface-Slope, (3 decimals, *i. e.*, ·000, to be prefixed by reader).
4		Direction (referred to the current-axis as N. S. line), and Velocity (in feet per second) of the Wind, at beginning and end of each Set.
5		Initial of the Timekeeper.
6	a_y	Rod-velocities past the several verticals whose distances (y) from mid-channel are specified at the head of each sub-column, each entry being the mean of three observations.
	H_y	Average Soundings for the several verticals whose distances (y) from mid-channel are specified at the head of each sub-column, each being the mean of six Soundings along a Float-Course. } given only for the Distributaries, Table LVI.
		"Range" of the above, *i. e.*, difference between the greatest and least of the six soundings along a Float-Course. }
7	D	Cubic Discharge through the whole section (in cub. ft. per sec.), computed from the velocity-data of Col. 6.
8	V	Mean velocity through the Section, computed as the quotient Discharge ÷ Area.
9		Average amount of Silt from surface to bed, at mid-channel, (in grains per cub. ft.,) given for the Belra Site only.

Digitized by Google

MEAN VELOCITIES

Solání Left

[*Instruments—Nos.* **101, 103.** 1″ *tin Tube-Rods,*

Serial No.	Date, 1875-78-79.	1	2					3			4				5				
			Depth.					Fall of Water-Surface.			Wind.								Mean past [Each Velocity Left of
			Central.	Variation.	Hyd. Mean.	Surface-Breadth.	Length of Rod.	Upper 5 miles.	Lower 4½ miles.	Local Slope.	From		To		Timekeeper's Initial.	Assumed zero in computing Discharge.			
			H		R	b	l	F_1	F_2	S	Direction.	Velocity.	Direction.	Velocity.			42½	39½	37½	35
101.	14-12-'78	10·00	−·03	7·99	82·0	9	5·95	5·57	183	NE	4	S	9	cl	?o	?	3·66	3·95	
	19- „ „	9·87	−·03	·91	·0	9	5·93	5·47	190	SE	1	NE	5	C	?o	3·53	3·68	3·90	
	20- „ „	·83	−·01	·92	·5	9	5·87	5·43	195	..	0	W	3	cl	?o	3·57	3·85	3·95	
δ	Range,	·17	..	·08	·5	0	·08	·14	012	..	..	..	..	..	?	?·04	·19	·05	
v	Means of 3,	9·90	..	7·94	82·2	9	5·92	5·49	189	SE δ E 1				..	?	3·55	3·73	3·93	
Series 102.	2-4-'75	9·75	·00	7·86	82·5	9	5·55	·555	Not observed.	..	?0	?	?0	R	Not observed.		3·19	3·30	
	„ „	·75	·00	·86	·5	9	„	„		?	?0	..	0	W			3·06	3·21	
	31-3- „	·70	·00	·83	·5	9	5·60	5·50		..	0	?	?0	R			3·45	3·53	
	„ „	·70	·00	·83	·5	9	„	„		?	?0	..	0	W			3·17	3·26	
	1-4- „	·70	·00	·83	·5	9	5·60	5·50		..	0	?	?0	R			3·03	3·30	
	„ „	·70	·00	·83	·5	9	„	„		?	?0	V	20	W			3·09	3·28	
	30-3- „	·65	·00	·80	·5	9	5·65	5·45		..	0	..	0	R			3·30	3·30	
	„ „	·65	·00	·80	·5	9	„	„		..	0	..	0	W			3·23	3·28	
	29-3- „	·50	·00	·70	·5	9	5·80	5·30		..	0	..	0	R			3·23	3·26	
	„ „	·50	·00	·70	·5	9	„	„		..	0	..	0	W			3·14	3·31	
	3-4- „	·50	·00	·70	·5	9	5·65	5·40		..	0	?	?	R			3·19	3·23	
	„ „	·50	·00	·70	·5	9	„	„		?	?0	..	0	W			3·30	3·23	
δ	Range,	·25	..	·16	·0	0	·25	·25	..	..	..	..	0 ..	..	?	..	·39	·32	
v	Means of 12,	9·63	..	7·79	82·5	9	5·64	5·45	..	? Calm				..	?	..	3·20	3·29	
Series 103.	28-5-'78	9·48	·00	7·69	82·5	9	5·92	5·18	205	W	6	NW	7	R	?o	3·47	3·75	3·66	
	12-4- „	·41	+·12	·65	·5	9	5·99	4·71	198	SE δ S	7	NE	8	R	?o	3·57	3·70	3·80	
	27-5- „	·40	·00	·64	·5	9	5·90	5·10	210	SW δ W	8	SW	8	T	?o	3·37	3·49	3·75	
	15-4-'79	·37	+·03	·62	·5	8½	5·83	5·22	215	NW	l	SW	12	B	?o	3·41	3·41	3·57	
δ	Range,	·11	..	·07	·0	·5	·16	·51	017	..	..	..	..	..	?	·20	·34	·23	
v	Means of 4,	9·42	..	7·65	82·5	8·9	5·91	5·05	207	SW δ W 3				..	?	3·46	3·59	3·70	

Digitized by Google

AND CUBIC DISCHARGES. **TABLE XXXIV.**

AQUEDUCT.

No. **102.** *2½" wood Rods*].

6															7	8
VELOCITIES each vertical. is the mean of three observations].															CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
centre.				Centre.	Right of centre.											
32½	30	20	10		10	20	30	32½	35	37½	40	41½	41⅞	42½	D	V
4·11	4·05	4·11	4·38	4·44	4·41	4·35	4·22	4·29	4·22	4·00	4·05	3·90	3·57	?o	3,429	4·03
3·92	4·14	4·11	4·29	4·20	4·22	4·32	4·29	4·08	4·11	3·95	3·90	3·85	3·26	?o	3,409	4·04
3·90	4·11	4·38	4·41	4·29	4·41	4·11	4·22	4·14	4·22	4·22	3·80	3·59	3·23	?o	3,441	4·12
·21	·09	·27	·12	·24	·19	·24	·07	·21	·11	·27	·25	·31	·34	?	32	·09
3·98	4·10	4·20	4·36	4·31	4·35	4·26	4·24	4·17	4·18	4·06	3·92	3·78	3·35	?	3,427	4·06
3·26	3·45	3·45	3·75	3·75	3·53	3·66	3·75	3·70	3·61	3·75	3·37	3·23			2,890	3·49
3·33	3·37	3·64	3·64	3·82	3·70	3·43	3·59	3·80	3·55	3·47	3·33	3·11			2,875	3·47
3·53	3·70	3·75	3·66	3·85	3·75	3·90	3·66	3·70	3·75	3·6	3·53	3·19			3,005	3·64
3·61	3·73	3·77	3·87	3·64	3·68	3·57	3·77	3·77	3·70	3·55	3·41	3·28			2,915	3·54
3·50	3·49	3·61	3·66	3·57	3·95	3·75	3·57	3·80	3·61	3·61	3·41	3·06			2,876	3·49
3·37	3·33	3·59	3·73	3·70	3·68	3·85	3·66	3·77	3·73	3·73	3·39	3·33			2,915	3·53
3·49	3·57	3·66	3·85	3·70	3·80	3·90	3·95	3·80	3·85	3·57	3·53	3·23			2,954	3·60
3·37	3·53	3·87	4·00	3·66	3·90	3·80	4·05	3·95	3·64	3·66	3·77	3·30			2,974	3·63
3·49	3·61	3·80	3·95	4·00	3·90	4·00	3·85	3·85	3·70	3·61	3·61	3·26			2,995	3·71
3·57	3·51	3·80	3·90	3·92	4·03	4·03	4·00	4·08	3·95	3·90	3·66	3·39			3,013	3·73
3·41	3·41	3·80	3·75	3·37	3·61	3·70	3·61	3·75	3·70	3·70	3·33	3·13			2,804	3·47
3·26	3·43	3·73	3·77	3·85	3·55	3·47	3·61	3·82	3·77	3·57	3·64	3·00			2,844	3·52
·35	·40	·42	·36	·63	·50	·60	·48	·38	·40	·43	·44	·39	..	?	209	·26
3·42	3·51	3·71	3·79	3·74	3·76	3·76	3·76	3·82	3·71	3·64	3·50	3·21	..	?	2,922	3·57
3·85	3·77	4·11	3·95	3·75	3·85	4·00	4·20	4·17	3·97	3·85	4·03	3·55	3·19	?o	3,107	3·86
3·80	3·85	3·90	4·05	3·90	4·29	4·00	4·22	4·22	4·00	3·90	4·05	3·45	3·66	?o	3,107	3·88
3·70	3·85	4·05	4·05	4·17	4·11	4·00	4·00	4·00	4·05	3·85	3·85	3·41	3·00	?o	3,126	3·91
3·75	3·70	3·80	4·05	4·00	4·11	3·95	4·00	4·00	4·00	3·90	3·49	3·49	3·00	?o	3,034	3·82
·15	·15	·31	·10	·42	·44	·05	·22	·22	·08	·05	·56	·14	·66	?	92	·09
3·78	3·79	3·97	4·03	3·96	4·09	3·99	4·11	4·10	4·01	3·88	3·86	3·48	3·21	?	3,093	3·87

Not observed. Assumed zero in computing Discharge.

Digitized by Google

MEAN VELOCITIES

Solání Left

Instruments—No. 104. 2½" wood *Rods*.

Serial No.	Date, 1878-77-78.	2 Depth. Central. H	Variation.	Hyd. Mean. R	Surface-Breadth. b	Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_2	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initials.		Mean past Rush Velocity Left of 42½'	30½'	37½'	35'
Series 104.	23-2-'78	9·15	·00	7·53	83·4	8½	5·65	5·15		..	0	?	20	R		3·39	3·45	3·57
	„ „	·15	·00	·53	·4	8½	„	„		?	20	..	0	W		3·37	3·49	3·53
	24-2- „	·15	·00	·53	·4	8½	5·65	5·15		..	0	?	20	R		3·41	3·45	3·61
	„ „	·15	·00	·53	·4	8½	„	„		?	20	..	0	W		3·33	3·53	3·59
	25-2- „	·10	·00	·50	·5	8½	5·60	5·10		..	0	?	20	R		3·41	3·45	3·61
	„ „	·10	·00	·50	·5	8½	„	„		?	20	..	0	W		3·39	3·43	3·59
	26-2- „	·10	·00	·50	·5	8½	5·70	5·15		..	0	?	20	R		3·49	3·53	3·80
	„ „	·10	·00	·50	·5	8½	„	„		?	20	X	20	W		3·43	3·68	3·61
	19-3- „	8·90	·00	·38	·7	8½	5·65	5·00		..	0	..	0	R		3·33	3·45	3·57
	20-3- „	·90	·00	·38	·7	8½	5·80	5·10		..	0	?	20	W		3·33	3·51	3·41
	„ „	·90	·00	·38	·7	8½	„	„		?	20	..	0	R		3·33	3·61	3·61
	„ „	·90	·00	·38	·7	8½	5·90	„		..	0	..	0	W		3·47	3·41	3·61
	δ Range,	·25	..	·15	·3	·0	·30	·15	..	..	...	..	..	..	?	·21	·27	·39
	v Means of 12,	9·05	..	7·47	83·5	8·5	5·70	5·12	..	? N 1				..	?	3·39	3·50	3·59
108.	6-4-'78	8·67	·00	7·22	84·0	8	5·93	4·74	225	NW	2	W	5	T	?o	3·41	3·45	3·57
	29-3- „	·54	−·12	·14	·1	8	5·86	4·54	218	SW	1	..	0	R	?o	3·30	3·37	3·75
	δ Range,	·13	..	·09	·1	0	·07	·20	·007	..	..	..	..	..	?	·11	·08	·18
	v Means of 2,	8·61	..	7·19	84·0	8	5·89	4·64	222	W & N 2				..	?	3·36	3·41	3·66
Series 106.	21-2-'78	8·19	·00	6·90	85·0	7½	5·81	4·39	220	SE	3	..	0	T		3·33	3·33	3·37
	12-3- „	·00	·00	·77	·0	7½	5·85	4·20	210	SE	6	SE	2	T		3·06	3·19	3·33
	5-3-'77	·00	·00	·77	·0	7½	5·90	4·30	?	S	6	V	3	P		3·33	3·26	3·53
	6-3- „	7·98	·00	·75	·0	7½	5·92	4·28	188	..	0	..	0	W		3·23	3·43	3·51
	22-2- „	·97	·00	·75	·0	7½	5·98	4·17	?	S	13	S	17	W		3·06	3·51	3·35
	23-3- „	·97	·00	·75	·0	7½	5·83	4·27	?	V	5	V	3	P		3·09	3·28	3·41
	δ Range,	·22	..	·15	·0	0	·17	·22	?033	..	...	..	..	..	?	·27	·24	·20
	v Means of 6,	8·02	..	6·78	85·0	7·5	5·88	4·27	?206	S & E 4				..	?	3·16	3·30	3·42
Series 107.	9-3-'78	7·56	+·02	6·46	85·0	7	5·89	3·96	220	..	0	N	3	T		3·23	3·30	3·33
	8-3- „	·53	−·03	·43	·0	7	5·92	3·93	223	SW	9	NW	4	R		3·16	3·26	3·61
	11-3- „	·51	·00	·42	·0	7	5·94	3·91	235	..	0	..	0	R		3·19	3·37	3·37
	7-3- „	·50	·00	·41	·0	7	5·90	3·90	223	S	6	..	0	T		3·13	3·37	3·33
	21-2-'77	·48	·00	·40	·0	7	6·02	3·98	?	V	9	V	9	P		2·91	3·06	3·26
	15-3- „	·43	·00	·36	·0	7	5·87	3·93	?	S	4	N	7	W		3·17	3·23	3·43
	δ Range,	·13	..	·10	·0	0	·15	·08	?015	..	...	..	..	..	?	·32	·31	·35
	v Means of 6,	7·50	..	6·41	85·0	7	5·92	3·94	?225	WSW 1				..	?	3·13	3·27	3·39

Digitized by Google

AND CUBIC DISCHARGES. **TABLE XXXV.**

AQUEDUCT.

Nos. **105** *to* **107.** 1″ *tin Tube-Rods.*

6															7	8
VELOCITIES each vertical. (is the mean of three observations).															CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
centre.				Centre.	Right of centre.											
32½	30	20	10		10	20	30	32½	35	37½	40	41½	41⅞	42½	D	V
3·45	3·66	3·75	3·66	3·85	3·95	3·23	3·61	3·70	3·75	3·53	3·45	3·09			2,768	3·55
3·70	3·59	3·85	3·85	3·95	3·85	3·73	3·66	3·73	3·55	3·59	3·49	3·21			2,873	3·69
3·70	3·70	3·75	3·75	3·75	3·57	3·70	3·70	3·57	3·57	3·61	3·45	3·03			2,811	3·61
3·66	3·75	3·55	3·75	3·87	3·77	3·59	3·92	3·66	3·73	3·57	3·45	3·06			2,807	3·61
3·70	3·80	3·75	3·85	4·00	3·57	3·53	3·57	3·61	3·57	3·61	3·41	?			2,747	3·63
3·66	3·80	3·77	3·90	3·90	3·66	3·75	3·77	3·75	3·68	3·66	3·51	?			2,780	3·68
3·61	3·66	3·80	3·70	3·80	3·53	3·90	3·49	3·80	3·57	3·66	3·53	3·13			2,842	3·67
3·82	3·70	3·66	3·87	3·68	3·87	3·59	3·59	3·66	3·61	3·64	3·47	3·21			2,788	3·60
3·57	3·57	3·61	3·80	3·53	3·57	3·75	3·70	3·61	3·61	3·57	3·41	?			2,671	3·53
3·68	3·77	3·61	3·68	3·85	3·70	3·75	3·64	3·57	3·64	3·57	3·31	?			2,726	3·60
3·61	3·75	3·61	3·75	3·70	3·70	3·85	3·70	3·66	3·66	3·61	3·49	?	Not observed.		2,731	3·61
3·66	3·57	3·77	3·73	3·77	3·85	3·55	3·66	3·68	3·64	3·59	3·59	?			2,720	3·59
·37	·23	·30	·24	·47	·42	·67	·43	·23	·20	·13	·28	?·18	..	?	202	·16
3·65	3·69	3·71	3·77	3·80	3·72	3·66	3·67	3·67	3·63	3·60	3·46	?3·12	..	?	2,771	3·61
3·85	4·05	3·80	3·80	3·95	4·00	3·90	4·00	3·85	3·90	3·53	3·53	3·23	3·00	?o	2,781	3·78
3·66	3·57	3·61	3·90	3·66	3·95	3·80	3·61	3·80	3·66	3·80	3·70	3·33	2·94	?o	2,629	3·62
·19	·48	·19	·10	·29	·05	·10	·39	·05	·24	·27	·17	·10	·06	?	152	·16
3·76	3·81	3·71	3·85	3·81	3·98	3·85	3·81	3·83	3·78	3·67	3·62	3·28	2·97	?	2,705	3·70
3·57	3·57	3·53	3·95	3·66	3·66	3·66	3·53	3·61	3·66	3·61	3·61	3·26	2·94		2,465	3·54
3·41	3·57	3·66	3·61	3·53	3·53	3·66	3·57	3·66	3·80	3·41	3·53	3·13	2·94		2,377	3·50
3·66	3·85	3·77	3·55	3·57	3·35	3·37	3·39	3·59	3·51	3·59	3·30	2·96	?		2,368	3·48
3·55	3·55	3·45	3·24	3·53	3·37	3·68	3·55	3·37	3·31	3·37	3·13	3·08	?		2,328	3·43
3·47	3·61	3·75	3·85	3·80	3·66	3·51	3·51	3·51	3·53	3·43	3·33	2·93	?		2,399	3·54
3·53	3·57	3·41	3·33	3·55	3·61	3·16	3·49	3·37	3·47	3·39	3·37	3·09	?	0 in computing D.	2,227	3·34
·25	·30	·36	·71	·27	·31	·52	·18	·29	·49	·24	·48	·33	?	?	238	·20
3·53	3·62	3·60	3·59	3·61	3·53	3·51	3·51	3·52	3·55	3·47	3·38	3·08	?2·94	?	2,361	3·47
3·49	3·70	3·57	3·53	3·66	3·66	3·41	3·57	3·49	3·53	3·37	3·45	3·16	3·06		2,280	3·47
3·61	3·53	3·61	3·53	3·37	3·70	3·61	3·90	3·61	3·66	3·49	3·53	3·26	3·13		2,228	3·48
3·45	3·37	3·61	3·45	3·57	3·30	3·61	3·66	3·70	3·41	3·26	3·30	3·13	2·78		2,211	3·46
3·53	3·33	3·45	3·37	3·61	3·57	3·41	3·37	3·61	3·70	3·70	3·41	3·16	3·00		2,183	3·42
3·28	3·41	3·55	3·37	3·41	3·45	3·51	3·43	3·41	3·43	3·37	3·17	2·88	?		2,131	3·35
3·39	3·41	3·45	3·66	3·59	3·55	3·66	3·24	3·23	3·35	3·14	3·08	2·87	?	0 in computing D.	2,152	3·41
·33	·37	·16	·29	·29	·40	·25	·66	·47	·35	·56	·45	·39	?·35	?	99	·13
3·46	3·46	3·54	3·49	3·54	3·54	3·54	3·53	3·51	3·51	3·39	3·32	3·08	?2·99	?	2,189	3·43

Digitized by Google

MEAN VELOCITIES

Solání Right

[*Instruments*—1″

Serial No.	Date, 1876-77-78.	1	2				3			4				5	Mean past [Each Velocity Left of			
			Depth.				Fall of Water-Surface.			Wind.								
			Central.	Variation.	Hyd. Mean.	Surface-Breadth.	Length of Rod.	Upper 5 miles.	Lower 4½ miles.	Local Slope.	From		To		Timekeeper's Initial.				
			H		R	b	l	F_1	F_2	S	Direction.	Velocity.	Direction.	Velocity.		42½	41⅞	41¼	40
Series 108.	31-5-'77	10·01	−·02	8·00	82·0	9¼	5·89	5·66	189	..	0	NE	3	W	Assumed zero in computing Discharge.	Not observed.	3·41	3·64
	30-5- „	·00	·00	7·99	·0	9½	5·90	5·65	?	S	4	SSW	12	P			3·33	3·80
	1-6- „	·00	·00	·99	·0	9½	5·90	5·70	?	..	0	SE	3	P			3·53	4·00
	„ „	·00	·00	·99	·0	9¼	„	„	?	SE	3	E	11	W			3·30	3·66
	4 6- „	·00	+·02	·99	·0	9	5·85	5·60	?	S	6	NE	10	P			3·30	3·70
	5-6-'76	·00	·00	·99	·0	9	5·80	5·70	185	..	0	S	5	W			3·66	4·00
	17-6- „	9·98	·00	·97	·0	9	5·87	5·68	195	NE	6	NE	14	W			3·57	3·97
	14-6- „	·97	+·02	·97	·0	9	5·83	5·67	190	NE	6	NE	8	H			3·49	3·92
	14-12-'78	·98	·00	·97	·0	9	5·97	5·55	175	S	9	?	?	Cl			3·31	3·75
	5-6-'77	·98	·00	·97	·0	9½	5·82	5·58	191	SW	7	N	8	W			3·57	3·61
	6-6- „	·98	·00	·97	·0	9½	5·82	5·58	188	..	0	..	0	P			3·43	3·70
	7-6- „	·97	·00	·97	·0	9½	5·83	5·57	?	NE	1	W	5	W			3·47	3·64
	„ „	·97	·00	·97	·0	9½	„	„	?	W	5	N	4	P			3·33	3·75
	8-6- „	·96	+·01	·96	·0	9½	5·74	5·61	?	N	1	W	4	W			3·3.	3·66
	„ „	·97	+·01	·97	·0	9½	5·73	5·62	?	W	4	S	1	P			3·26	3·64
	17-5-'76	·87	−·03	·90	·0	9	5·83	?	180	..	0	NE	7	W			3·35	3·73
	„ „	·85	·00	·89	·0	9	5·85	?	„	NE	7	N	9	H			3·80	3·75
	19-12-'78	·87	·00	·90	·0	9	5·93	5·47	200	NE	5	NE	1	C		3·06	3·19	3·68
	20-12- „	·82	+·02	·91	·5	9	5·88	5·42	205	W	4	SW	12	Cl		3·13	3·24	3·92
	δ Range,	·19	..	·11	·5	·5	·24	·28	?030	..	..	..	..	..	?	?·22	·61	·39
	v Means of 19,	9·96	..	7·96	82·0	9·3	5·85	5·61	?189	NE b E 1				..	?	?3·16	3·41	3·76
Series 109.	29-7-'78	9·68	+·05	7·82	82·5	9	6·07	5·23	198	..	0	S b W	8	B	Assumed zero in computing Discharge.	Not observed.	3·49	3·68	4·17
	2-5-'77	·65	·00	·80	·5	9	5·85	4·95	?	E	7	N	18	P			?	3·41	3·49
	3-5- „	·65	·00	·80	·5	9	5·80	4·95	190	NE	6	..	0	W			?	3 23	3·61
	„ „	·65	·00	·80	·5	9	„	„	„	NE	12	N	10	P			?	3 23	3·85
	14-11- „	·64	+·02	·79	·5	9	6·16	5·14	?	S	4	S	5	G			3·37	3·55	3·87
	„ „	·66	+·02	·81	·5	9	6·14	5·16	?	S	5	SSW	13	P			3·57	3·57	4·08
	1-6-'76	·65	−·04	·80	·5	9	5·85	5·45	?	S	8	NE	9	W			?	3·49	3·95
	19-11-'77	·63	·00	·79	·5	9	6·07	5·28	203	V	1	..	0	G			3·55	3·68	3·90
	„ „	·63	.00	·79	·5	9	„	„	„	V	5	NW	9	P			3·85	3·61	4·08
	15-5-'76	·63	.00	·79	·5	9	5·82	5·43	185	..	0	..	0	H				3·23	3·77
	„ „	·63	.00	·79	·5	9	„	„	„	..	0	..	0	W				3·41	3·92
	11-5- „	·63	−·05	·79	·5	9	5·82	5·43	195	..	0	..	0	W				3·19	3·68
	„ „	·58	−·05	·76	·5	9	5·87	5·38	„	..	0	..	0	H				3·19	3·64
	12-5- „	·60	.00	·77	·5	9	5·80	5·40	190	NE	11	NE	17	W				3·33	3·80
	3-6- „	·56	−·12	·75	·5	9	5·94	5·36	185	..	0	NE	10	W				3·45	3·77
	2-6- „	·52	−·04	·72	·5	9	5·73	5·32	195	E	5	NE	9	H				3·45	3·68
	16-5- „	.50	.00	·70	·5	9	5·85	5·35	195	..	0	NE	10	H				3·19	3·77
	12-4-'78	·51	.00	·71	·5	9	5·89	4·81	190	V	12	E	23	B		3·13	3·30	3·70
	δ Range,	·18	..	·12	·0	0	·43	·64	?018	..	..	..	..	..	?	?·72	·49	·68
	v Means of 18,	9·61	..	7·78	82·5	9	5·91	5·24	?193	NE b E 3				..	?	?3·49	3·40	3·82

Digitized by Google

TABLE XXXVI.

AND CUBIC DISCHARGES.

AQUEDUCT.

tin Tube-Rods].

6															7	8
VELOCITIES each vertical. is the mean of three observations].															CUBIC DISCHARGE in cub. feet per sec	MEAN VELOCITY.
centre.						Centre.	Right of centre.									
37½	35	32½	30	20	10		10	20	30	32½	35	37½	39½	42½	D	V
3·85	3·97	4·11	3·85	3·82	4·11	4·17	3·87	4·26	4·11	3·92	3·85	3·77			3,328	3·91
3·85	4·05	4·00	4·17	4·26	4·20	4·11	4·05	4·22	4·05	3·95	3·73	3·70			3,385	3·98
3·59	3·90	4·03	4·00	4·08	4·17	4·22	4·00	4·17	4·17	4·08	3·73	3·66			3,364	3·96
3·87	3·77	3·90	3·97	4·11	4·22	3·90	4·08	4·11	4·00	3·95	3·87	3·53			3,287	3·87
3·97	3·97	4·05	4·08	4·11	3·95	4·26	4·35	4·17	4·05	3·92	3·82	3·53			3,377	3·97
4·08	4·17	4·32	4·22	3·97	4·26	4·20	4·14	3·90	3·92	4·08	3·75	3·61			3,340	3·93
4·29	4·29	4·32	4·38	4·35	4·17	4·41	4·11	4·22	4·11	4·00	3·82	3·82	3·49		3,528	4·16
4·03	4·26	4·22	3·95	4·44	4·29	4·32	4·32	3·90	4·00	3·80	3·73	3·64	3·30		3,424	4·04
4·20	4·35	4·48	4·61	4·35	4·55	4·41	4·41	4·69	4·35	4·11	4·05	3·90	3·80		3,651	4·21
3·97	4·11	4·17	4·08	4·14	4·14	4·29	3·85	4·20	3·95	3·92	3·87	3·59			3,385	3·99
3·97	4·26	4·20	4·00	4·17	4·22	4·14	3·97	4·11	4·05	3·77	3·92	3·59			3,355	3·96
3·73	4·05	4·03	4·00	4·08	4·22	4·11	4·05	4·26	3·92	3·95	3·80	3·53			3,335	3·94
3·80	4·03	4·17	4·11	4·32	3·92	4·05	4·17	4·11	4·17	3·90	3·80	3·68			3,355	3·96
4·08	4·11	3·80	3·95	3·80	4·03	4·29	4·29	3·90	4·11	3·92	3·75	3·70			3,283	3·88
3·87	3·77	3·92	4·00	4·00	3·95	4·05	4·32	3·97	3·85	3·92	3·75	3·70			3,264	3·85
3·95	4·17	4·29	4·20	4·14	4·11	4·20	4·20	3·97	4·05	3·85	3·75	3·61			3,313	3·95
4·32	4·14	4·26	4·11	4·20	4·44	4·26	4·08	4·05	4·11	3·82	3·73	3·45			3,353	4·00
4·00	4·14	4·44	4·32	4·41	4·55	4·22	4·32	4·08	4·03	4·11	4·03	3·70	3·59		3,444	4·11
4·20	4·20	4·32	4·35	4·48	4·29	4·35	4·29	4·35	4·29	4·17	4·05	3·85	3·66		3,519	4·22
·73	·58	·68	·76	·68	·63	·51	·56	·79	·50	·40	·32	·45	?·50	?	387	·45
3·98	4·09	4·16	4·12	4·17	4·20	4·21	4·15	4·14	4·07	3·95	3·83	3·66	?3·57	?	3,384	4·00
4·26	4·41	4·44	4·48	4·69	4·65	4·69	4·48	4·48	4·08	3·95	4·11	3·80			3,577	4·35
3·90	4·11	3·92	3·95	4·26	4·03	3·95	4·00	3·90	4·08	3·85	3·75	3·75			3,176	3·87
3·77	3·80	3·90	3·90	4·08	4·14	3·80	4·08	3·87	3·95	3·85	3·85	3·61			3,104	3·78
3·92	3·85	4·17	3 77	3·85	3·85	3·85	4·20	3·85	3·90	3·55	3·75	3·61			3,071	3·74
4·17	4·17	4·35	4·32	4·44	4·55	4·65	4·51	4·48	4·32	4·08	4·08	3·87			3,511	4·28
4·05	4·35	4·26	4·48	4·61	4·41	4·29	4·38	4·14	4·22	4·14	3·87	3·95			3,425	4·17
3·90	4·08	4 05	4·11	4·17	4·22	4·26	4·14	3·95	4·00	3·85	3·73	3·26			3,227	3·93
4·35	4·29	4·35	4·29	4·20	4·41	4 44	4·51	4·17	4·11	4·11	3·82	3·73			3,376	4·12
4·17	4·32	4·20	4·26	4·20	4·20	4·41	4·20	4·32	4·26	4·08	3·95	3·70			3,378	4·13
4·14	4·22	4·17	3·90	4·20	4·00	4·08	3·90	3·90	4·17	3·85	3·80	3·43			3,159	3·86
3·92	4·05	4·26	4·29	4·22	4·14	3·85	3·92	3·97	3·90	3·75	3·70	3·49			3,164	3·87
3·92	3·97	4·08	4·17	3·92	4·17	4·22	4·17	3·92	3·97	3·77	3·51	3·41			3,163	3·83
4·00	3·97	3·92	4·00	4·05	4·03	4·11	4·11	4·05	4·00	3·68	3·75	3·45			3,157	3·88
3·82	3·95	4·03	4·08	4·00	3·80	4·22	4·05	3·90	3·75	3·61	3·64	3·43			3,135	3·84
4·00	4·03	4·05	3·97	4·00	4·14	3·92	4·08	4·20	3·87	3·85	3·64	3·47			3,141	3·87
4·08	4·17	4·00	4·20	4·38	3·95	4·05	4·14	3·80	3·80	3·73	3·66	3·43			3,147	3·89
3·90	4·14	4·05	3·90	3·97	3·90	4·05	4·00	3·82	3·82	3·80	3·57	3·49			3,064	3·79
4·05	4·17	4·17	4·35	3·95	4·00	4·05	4·17	4·00	4·17	3·90	3·70	3·75	3·85	..	3,190	3·95
·58	·61	·54	·71	·84	·85	·89	·61	·68	·57	·59	·60	·69	?	?	513	·61
4·02	4·11	4·13	4·13	4·18	4·14	4·16	4·17	4·04	4·02	3·86	3·77	3·59	?3·85	?	3,231	3·95

Not observed. Assumed zero in computing Discharge.

Digitized by Google

MEAN VELOCITIES

Solání Right

[*Instruments*— { *No.* 110. 1″ *wood Rods till* 8-5-'76,
No. 111. 1″ *tin Tube-*

Serial No.	Date, 1876-77-78-79.	2 Depth. Central. H	Variation.	Hyd. Mean. R	2 Surface-Breadth. b	Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Mean past [Each Velocity Left of 42½	41⅞	41½	40
Series 110.	15-4-'79	9·42	+·05	7·65	82·5	8½ 9	5·78	5·27	200	V	l	SW	12	B	Assumed zero in computing Discharge.	3·06	2·97	3·70
	28-5-'78	·42	·00	·65	·5	9	5·98	5·12	188	NW	l	V	l	R		3·06	3·41	3·70
	27-4-'77	·41	−·02	·65	·5	9	5·79	5·26	?	NE	4	N	9	W		?	3·19	3·33
	„ „	·42	·00	·65	·5	9	5·78	5·27	?	NW	6	NE	4	P		?	3·16	3·37
	8-5-'76	·40	·00	·64	·5	9	5·85	5·25	205	..	0	NE	12	W		?	3·70	3·68
	3-6- „	·39	−·22	·63	·5	9	6·11	5·19	185	NE	10	N	6	H		?	3·41	3·64
	8-8-'78	·39	−·03	·63	·5	8½	6·21	4·94	203	..	0	..	0	R		3·33	3·75	4·35
	27-5- „	·38	·00	·63	·5	9	5·92	5·08	190	S	8	SW	13	T		3·19	3·30	3·75
	1-5-'76	·33	−·05	·62	·8	9	5·82	5·33	195	..	0	..	0	W		.	3·41	3·68
	„ „	·30	·00	·61	83·0	9	5·85	5·30	„	..	0	..	0	H			3·53	3·68
	2-5- „	·30	·00	·61	·0	9	5·85	5·25	195	..	0	..	0	W			3·30	3·73
	„ „	·30	·00	·61	·0	9	„	„	„	..	0	..	0	H			3·30	3·61
	3-5- „	·30	·00	·61	·0	9	5·85	5·25	195	..	0	..	0	W			3·39	3·55
	„ „	·30	·00	·61	·0	9	„	„	„	..	0	..	0	H			3·23	3·47
	28-4- „	·27	·00	·59	·1	9	5·78	5·27	190	..	0	..	0	H			3·19	3·64
	29-4- „	·25	·00	·58	·1	9	5·80	5·25	190	..	0	..	0	W			3·35	3·64
	„ „	·25	·00	·58	·1	9	„	„	„	..	0	..	0	H			3·11	3·47
	„ „	·25	·00	·58	·1	9	„	„	„	..	0	..	0	W			3·30	3·49
	„ „	·25	·00	·58	·1	9	„	„	„	..	0	..	0	H			3·16	3·57
	26-4-'77	·25	·00	·58	·1	9	5·75	5·10	183	..	0	N	13	P			3·09	3·37
	∂ Range,	·17	..	.07	·6	·5	·46	·39	?022	..	..	..	..	..	?	?·27	·78	1·02
	v Means of 20,	9·33	..	7·61	82·8	9·0	5·86	5·22	?193	N1				..	?	?3·16	3·31	3·62
Series 111.	15-11-'77	9·06	+·18	7·48	83·5	8½	6·34	4·96	?	V	5	V	6	G	Assumed zero in computing Discharge.	3·30	3·53	4·05
	25-4-'78	·03	·00	·46	·6	8½	5·87	4·90	193	N	7	V	g	P		2·97	2·99	3·61
	20-4- „	·01	·00	·45	·6	8½	5·89	4·91	194	..	0	..	0	R		3·26	3·41	3·51
	„ „	·02	·00	·45	·6	8½	5·88	4·92	188	..	0	..	0	R		3·00	3·57	3·66
	26-4- „	·00	·00	·44	·6	8½	5·90	4·90	195	N	9	V	l	P		2·88	3·24	3·37
	12-11-'77	·00	·00	·44	·6	8½	6·05	4·50	?	V	5	S	15	G		3·19	3·49	3·66
	15-7-'76	8·98	+·01	·43	·6	8	5·92	4·98	195	..	0	E	17	H		3·11	3·61	4·05
	13-11-'77	·96	−·02	·42	·7	8½	6·04	4·46	182	N	8	..	0	P		3·37	3·53	3·75
	19-2-'76	·95	+·08	·41	·7	8	5·75	5·00	?	SW	6	NW	15	H		?	?	3·23
	23-5- „	·95	·00	·41	·7	8	5·85	4·95	195	..	0	SW	4	H		?	3·43	3·68
	24-5- „	·95	·00	·41	·7	8	5·85	?	?	SE	10	NE	10	W		?	3·30	3·57
	„ „	·95	·00	·41	·7	8	„	?	?	NE	10	V	12	H		?	3·37	3·73
	25-4-'77	·94	·00	·40	·7	8½	5·76	4·94	?	WSW	4	W	8	P		?	3·21	3·26
	„ „	·94	·00	·40	·7	8½	„	„	?	W	8	SW	7	W		?	2·99	3·43
	14-7-'76	·90	·00	·38	·7	8	5·90	4·90	205	..	0	..	0	H		3·35	3·73	3·80
	„ „	·90	·00	·38	·7	8	„	„	„	..	0	..	0	W		3·30	3·53	4·03
	∂ Range,	·16	..	·10	·2	·5	·59	?·54	?023	..	..	..	..	..	?	?·49	?·74	·82
	v Means of 16,	8·97	..	7·42	83·7	8·3	5·91	4·87	?195	NNW 1				..	?	3·17	?3·40	3·65

Digitized by Google

AND CUBIC DISCHARGES. **TABLE XXXVII.**

AQUEDUCT.

and 1″ tin Tube-Rods from 3-6-'76. }].
Rods. }

6															7	8
VELOCITIES each vertical. is the mean of three observations].															CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
centre.						Centre.	Right of centre.									
37½	35	32½	30	20	10		10	20	30	32½	35	37½	39½	42½	D	V
3·66	4·11	4·00	3·90	3·90	3·80	3·85	4·11	3·90	3·95	3·90	3·85	3·75	3·57		3,047	3·82
3·90	4·17	4·05	3·87	4·29	4·17	4·17	3·90	4·32	3·82	3·97	3·70	3·59	3·57		3,223	4·02
3·53	3·53	3·57	3·70	3·85	3·77	4·00	4·14	3·82	3·77	3·85	3·59	3·41	3·43		2,958	3·70
3·68	3·87	3·82	3·80	3·80	3·80	3·95	4·00	3·90	3·97	3·73	3·51	3·37	3·55		2,976	3·73
4·03	4·17	4·29	4·17	3·80	4·17	4·11	4·20	3·77	3·80	3·92	3·77	3·57	?		3,067	3·83
3·92	4·00	4·08	4·05	4·14	4·03	3·80	4·05	4·08	3·82	3·75	3·53	3·31	?		3,049	3·82
4·69	4·84	4·96	4·55	4·38	4·48	4·41	4·35	4·26	3·95	3·82	4·00	3·61	3·53		3,385	4·24
4·00	3·95	4·05	4·11	4·17	4·11	4·00	4·05	4·11	4·11	3·70	3·75	3·57			3,122	3·92
4·03	4·29	4·38	4·22	4·20	4·22	4·00	4·03	3·92	3·92	3·82	3·68	3·41			3,094	3·90
3·82	4·17	4·11	4·17	4·29	4·08	4·08	4·00	3·80	3·80	3·68	3·75	3·41			3,064	3·87
3·90	4·03	3·95	4·00	4·03	4·38	3·95	3·66	3·82	3·80	3·77	3·64	3·43			2,998	3·79
3·96	4·00	4·20	4·20	4·11	4·22	4·11	4·11	4·03	3·92	3·68	3·51	3·57			3,090	3·90
3·87	3·87	4·22	3·85	4·00	4·00	3·80	4·11	4·08	3·70	3·82	3·57	3·49			3,001	3·80
3·68	3·85	4·00	4·00	3·95	4·03	4·05	3·95	4·05	3·80	3·66	3·66	3·57			3,024	3·82
3·87	4·17	4·05	4·05	3·70	3·80	4·05	4·05	3·82	3·85	3·68	3·53	3·47			2,955	3·75
3·85	4·17	4·14	3·92	4·05	3·95	3·95	3·97	3·64	3·82	3·55	3·64	3·31			2,938	3·75
3·75	4·00	4·08	3·77	4·14	3·95	3·90	3·82	3·82	3·95	3·57	3·45	3·28			2,954	3·76
3·87	4·00	4·03	4·05	4·03	3·82	3·97	4·14	3·90	3·80	3·80	3·55	3·37			2,987	3·80
3·80	3·75	4·11	4·00	4·05	4·08	3·82	4·05	3·75	3·95	3·80	3·59	3·30			2,939	3·75
3·70	3·85	3·68	3·49	4·00	3·66	3·70	3·87	3·61	3·77	3·70	3·33	3·53	3·37		2,838	3·61
1·16	1·31	1·39	1·06	·68	·82	·71	·69	·71	·41	·42	·67	·47	?·20	..	547	·63
3·88	4·04	4·09	3·99	4·04	4·03	3·98	4·03	3·92	3·86	3·76	3·63	3·47	?3·50	..	3,035	3·83
4·22	4·05	4·11	4·22	4·20	4·17	4·41	4·05	4·22	4·17	4·11	4·08	3·82	3·55		3,055	3·97
3·85	3·64	3·82	3·92	3·87	3·68	3·77	4·05	3·73	4·05	3·85	3·61	3·51	?		2,832	3·69
3·95	3·85	3·97	3·95	3·90	3·95	4·14	3·75	4·11	3·85	3·85	3·66	3·57	?		2,952	3·85
3·85	4·17	3·90	3·75	3·90	3·90	3·90	3·92	4·08	3·85	3·80	3·61	3·37	?		2,899	3·78
3·75	3·90	4·00	4·00	3·90	4·00	3·87	3·90	3·82	3·82	3·73	3·61	3·43	3·33		2,875	3·76
3·95	4·11	4·03	4·05	4·29	4·22	4·11	4·17	4·17	4·11	3·87	3·87	3·66	3·61		3,077	4·02
4·29	4·41	4·44	4·17	4·17	4·32	4·22	4·29	4·11	4·00	3·85	3·70	3·61	3·49		3,095	4·06
3·95	3·92	4·20	4·17	4·32	4·14	3·90	4·00	4·17	4·00	3·77	3·77	3·70	3·61		3,029	3·98
3·75	3·75	3·85	3·92	3·90	3·97	4·00	4·17	4·05	3·97	3·66	3·41	3·33	2·91		2,881	3·79
3·87	3·90	4·14	4·14	3·90	3·92	4·03	4·22	3·75	3·70	3·70	3·49	3·55	?		2,873	3·78
3·77	4·03	4·05	4·17	4·05	4·00	4·03	3·97	3·87	3·87	3·80	3·66	3·49	?		2,910	3·82
3·73	3·97	4·08	3·97	4·14	4·11	3·97	4·00	3·75	3·82	3·73	3·59	3·53	?		2,891	3·80
3·82	3·77	3·82	3·70	3·61	4·08	3·90	3·95	4·00	3·87	3·68	3·61	3·45	3·55		2,835	3·73
3·61	3·80	3·73	3·80	3·66	3·80	3·97	3·85	3·87	3·85	3·55	3·64	3·33	3·49		2,811	3·70
4·17	4·22	4·32	4·38	4·20	4·17	4·14	4·22	4·03	4·14	3·87	3·75	3·53	3·41		3,041	4·02
4·17	4·26	4·05	4·08	4·03	4·14	4·14	4·26	4·11	3·90	3·85	3·70	3·57	3·37		3,004	3·97
·68	·77	·71	·68	·71	·64	·64	·54	·49	·47	·56	·67	·49	?·70	?	284	·37
3·92	3·98	4·03	4·02	4·00	4·04	4·03	4·05	3·99	3·94	3·79	3·67	3·53	?3·43	?	2,941	3·86

Assumed zero in computing Discharge. Not observed.

Digitized by Google

MEAN VELOCITIES

Solání Right

[*Instruments*—1″

Serial No.	Date, 1876-77-78.	2 Depth. Central. H	Variation.	Hyd. Mean. R	Surface-Breadth. b	Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_2	Local Slope. S	4 Wind. From Direction.	From Velocity.	To: Direction.	To: Velocity.	5 Timekeeper's Initial.	Mean past [Each Velocity Left of 42½	41⅞	41¼	40
Series 112.	6-4-'78	8·67	·00	7·23	84·0	8	5·93	4·74	193	W	3	NW	3	T	Assumed zero in computing Discharge.	2·83	3·30	3·61
	19-4-'77	·66	·00	·22	·0	8	5·84	4·76		NE	4	NNE	8	P			3·26	3·39
	13-4- „	·65	+·01	·21	·0	8	5·80	4·80	.	NE	7	N	21	W			3·23	3·53
	16-4- „	·64	·00	·20	·0	8	5·81	4·74	d	W	9	V	1	P			3·19	3·13
	„ „	·64	·00	·20	·0	8	„	„	ve	V	1	S	17	W			3·08	3·28
	17-4- „	·60	·00	·18	·0	8	5·80	4·70	er	W	7	WSW	6	P			3·00	3·37
	„ „	·60	−·01	·18	·0	8	„	„	se	WSW	6	W	4	W			3·11	3·41
	„ „	·59	·00	·17	·1	8	5·81	4·69	ob	W	4	W	1	P			3·17	3·26
	„ „	·59	·00	·17	·1	8	„	„	ot	W	1	W	5	W			3·16	3·30
	11-4- „	·58	−·01	·17	·1	8	5·82	4·78	N	NE	5	SE	9	P			3·19	3·43
	„ „	·57	−·01	·16	·1	8	5·83	4·77		SE	9	V	10	W			3·08	3·45
	„ „	·56	−·01	·16	·1	8	5·84	4·76		V	10	NE	1	P			3·19	3·28
	„ „	·55	·00	·15	·1	8	5·85	4·75		NE	1	S	9	W			3·21	3·59
	12-4- „	·55	·00	·15	·1	8	5·85	4·75		N	8	N	6	P			3·00	3·47
	10-7-'76	·53	·00	·13	·1	8	5·82	4·73		S	12	SW	14	W		3·21	3·45	3·82
	13-7- „	·50	·00	·11	·1	8	5·90	4·60	220	..	0	NNE	8	H		3·09	3·37	3·77
	„ „	·50	·00	·11	·1	8	„	„	„	NNE	8	NE	5	W		3·13	3·47	3·75
	20-8-'78	·41	−·12	·06	·2	8	5·99	4·41	198	WSW	5	WSW	1	R		3·13	3·19	3·53
	δ Range,	·26	..	·17	·2	0	·19	·39	?	..	..	..	..	..	?	?·38	·47	·69
	v Means of 18,	8·58	..	7·16	84·1	8	5·85	4·71	?	NW δ W 1				..	?	?3·08	3·20	3·47
113.	21-3-'78	8·16	·00	6 88	84·3	7½	5·84	4·36	228	..	0	V	1	T	?o	2·83	3·33	3·33
Series 114.	1-4-'76	8·05	·00	6·80	84·4	7	5·75	4·35	?	V	6	V	5	H	Assumed zero in computing Discharge.	2·83	2·91	3·24
	„ „	·05	·00	·80	·4	7	„	„	?	V	5	V	8	W		2·80	2·94	3·30
	4-4- „	·00	·00	·77	·4	7	5·80	4·30	205	..	0	SSW	6	W		2·73	2·90	3·26
	„ „	·00	·00	·77	·4	7	„	„	„	SSW	6	SW	7	H		2·63	2·99	3·21
	„ „	·00	·00	·77	·4	7	„	„	„	SW	7	SW	12	W		2·68	2·97	3·41
	5-3-'77	·00	·00	·77	·4	7½	5·90	4·30	?	V	1	S	6	P		?	3·13	3·31
	6-3- „	7·98	·00	·75	·4	7½	5·92	4·28	195	N δ E	7	..	0	W		?	2·90	3·45
	7-3- „	·98	·00	·75	·4	7½	5·92	4·28	?	V	1	S	17	P		?	3·23	3·33
	12-3-'78	·98	·00	·75	·4	7½	5·87	4·18	195	..	0	SE	8	T		2·89	3·16	3·26
	23-2-'77	·97	·00	·75	·4	7½	5·98	4·17		S	8	S	13	W		?	2·94	3·31
	6-4-'76	·98	+·05	·75	·4	7	5·82	4·28		..	0	SW	5	W		2·59	3·05	3·33
	„ „	·98	−·05	·75	·4	7	„	„		SW	5	SW	9	H		2·73	2·90	3·28
	„ „	·95	·00	·73	·4	7	5·85	4·25		..	0	..	0	H		2·54	2·87	3·37
	3-4- „	·95	·00	·73	·4	7	5·85	4 25		W δ S	4	..	0	H		2·68	3·06	3·28
	5-4- „	·95	·00	·73	·4	7	5·85	4·25		..	0	..	0	H		3·03	3·05	3·35
	„ „	·95	·00	·73	·4	7	„	„		..	0	..	0	W		2 61	2·90	3·41
	„ „	·95	·00	·73	·4	7	„	„		..	0	..	0	H		2·42	3·01	3·14
	„ „	·95	·00	·73	·4	7	„	„		..	0	SW	11	W		2·73	2·99	3·23
	26-6- „	·95	−·06	·73	·4	7	5·85	4·35	210	..	0	S	5	W		2·86	3·53	3·68
	„ „	·89	−·07	·69	·4	7	5·91	4·29	„	S	5	N	12	H		2·88	3·19	3·53
	δ Range,	·16	..	·11	·0	·5	·23	·18	?015	..	..	..	..	..	?	?·61	·66	·54
	v Means of 20,	7·98	..	6·75	84·4	7·1	5·85	4·28	?204	SSW 3				..	?	?2·73	3·03	3·33

Digitized by Google

AND CUBIC DISCHARGES. **TABLE XXXVIII.**

AQUEDUCT.

tin Tube-Rods].

6															7	8
VELOCITIES each vertical. is the mean of three observations].															CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
centre.						Centre.	Right of centre.									
37½	35	32½	30	20	10		10	20	30	32½	35	37½	39½	42½	D	V
3·80	4·17	4·11	3·80	4·17	4·05	4·11	4·35	4·00	3·90	3·75	3·57	3·57	3·45		2,892	3·92
3·64	3·64	3·75	3·75	3·70	3·80	3·77	3 85	3·80	3·59	3·68	3·55	3·51	3·31		2,684	3·65
3·64	3·92	3·85	3·70	3 87	3·80	3·87	4·00	3·66	3·90	3·75	3·77	3·30	3·45		2,722	3·70
3·59	3·70	3·70	3·73	3·70	4·00	3·95	3·75	3·73	3·77	3·51	3·57	3 33	3·30		2,692	3·66
3 64	3·61	3·92	3·77	3·70	3·80	3·90	3·80	3·73	3·68	3·80	3·57	3·39	3·26		2,689	3·66
3·68	3·85	3·77	3·85	3·45	3·90	3·97	3·70	3·95	3·82	3·75	3·66	3·45	3·39		2,698	3·69
3·75	3·85	3·87	3·82	3·75	4·08	3·90	4·00	3·77	3·68	3·80	3·66	3·49	3·43		2,718	3·72
3·55	3·70	4·00	3·80	3·45	3·85	4·08	3·66	3·70	3·73	3·77	3·64	3·43	3·39		2,674	3·66
3·68	3·73	3·77	3·77	3·82	3·82	4·00	3·85	3·85	3·77	3·59	3·70	3·33	3·30		2,722	3·73
3·70	3·59	3·73	3·73	3·82	4·11	4·05	3·95	3·90	3·75	3·73	3·51	3·33	3·39		2,742	3·76
3·57	3·92	3·87	3·70	3·80	3·57	3·59	3·87	3·85	4·00	3·66	3·64	3·53	3·49		2,661	3·66
3·51	3·64	3·82	3·49	4·00	3·70	3·92	3·87	3·90	3·75	3·85	3·66	3·49	3·47		2,726	3·75
3·64	3·53	3·82	3·77	3·77	3·87	3·75	3·73	3·68	3·66	3·73	3·57	3·59	3·45		2,651	3·65
3·53	3·77	3·87	3·77	3·61	3·75	3·68	3·97	3·85	3·57	3·70	3·68	3·57	3·30		2,636	3·63
4·22	4·11	3·95	4·08	4·03	4·11	4·22	3·97	3·77	3·82	3·61	3·64	3·47	?		2,798	3·86
3·87	4·03	4·00	3·85	3·95	3·95	3·85	3·95	3·90	3·70	3·90	3·57	3·41	?		2,713	3·75
4·11	4·11	4·00	4·14	4·11	4·05	4·00	4·20	3·95	3·80	3·85	3·51	3·66	?		2,799	3·87
3·80	3·95	3·75	3·70	3·70	3·85	3·90	3·95	3·85	3·90	3·95	3·80	3·57	3·61		2,677	3·74
·71	·64	·41	·65	·72	·54	·63	·69	·34	·43	·44	·29	·36	?·35	?	256	·29
3·72	3·82	3·86	3·79	3·80	3·89	3·92	3·91	3·94	3·77	3·74	3·63	3·47	?3·40	?	2,716	3·73
3·80	3·75	3·61	3·90	3·95	3·85	4·29	4·05	3·90	3·75	3·66	3·70	3·45	3·45	?0	2,669	3·85
3·39	3·64	3·49	3·66	3·59	3·57	3·77	3·70	3·59	3·45	3·55	3·39	3·17	3·00		2,402	3·51
3·39	3·51	3·80	3·66	3·49	3·66	3·68	3·87	3·66	3·41	3·61	3·43	3·24	2·97		2,401	3·51
3·55	3·59	3·64	3·59	3·66	3·77	3·92	3·55	3·73	3·45	3·66	3·45	3·31	2·94		2,447	3·60
3·43	3·55	3·66	3·73	3·75	3·70	3·97	3·85	3·70	3·61	3·51	3·39	3·28	3·00		2,467	3·63
3·51	3·49	3·70	3·57	3·66	3·66	3·66	3·70	3·75	3·57	3·59	3·28	3·23	3·06		2,413	3·55
3·37	3·61	3·53	3·68	3·55	3·68	3·85	3·80	3·55	3·66	3·66	3·41	3·23	3·33		2,414	3·55
3·66	3·59	3·64	3·73	3·97	3·68	3·87	3·68	3·66	3·68	3·64	3·45	3·31	3·31		2,484	3·66
3·70	3·75	3·68	3·49	4·00	3·80	3·66	3·66	3·85	3·75	3·59	3·57	3·37	3·23		2,485	3·66
3·80	3·75	3·85	3·80	3·70	3 57	3·75	3·95	3·75	3·85	3·53	3·45	3·49	3·33		2,465	3·63
3·47	3·57	3·64	3·55	3·87	3·73	3·82	3·90	3·96	3·61	3·66	3·30	3·35	3·17		2,486	3·67
3·55	3·57	3·75	3·75	3·61	3·70	3·59	3·80	3·61	3·59	3·51	3·39	3·26	3·06		2,381	3·51
3·47	3·49	3·66	3·68	3·47	3·80	3·66	3·70	3·73	3·51	3·55	3·37	3·21	3·00		2,374	3·50
3·70	3·59	3·68	3·66	3·80	3·59	3·87	3·97	3·82	3·49	3 61	3·39	3·23	2·91		2,453	3·63
3 41	3·28	3·59	3·64	3·57	3·57	3·47	3·68	3·70	3·64	3·51	3·43	3·26	2·99		2,345	3·47
3·64	3·55	3·80	3·61	3·59	3·68	3·73	3·80	3·75	3·70	3·59	3·49	3·28	2·96		2,418	3·58
3·49	3·64	3·64	3·75	3·77	3·80	3·61	3·75	3·70	3·64	3·64	3·37	3·37	3·11		2,416	3·58
3·70	3·70	3·70	3·80	3·51	3·66	3·68	3·80	3·73	3·80	3·49	3·37	3·37	3·08		2,410	3·57
3·45	3·68	3·75	3·75	3·82	3·95	3·80	3·85	3·80	3·49	3·55	3·51	3·23	3·16		2,461	3·64
3·97	4·00	3·95	3 87	3·75	4 00	3·95	3·85	3·92	3·80	3·66	3·70	3 33	3·17		2,544	3·76
3·77	3·92	4·03	3·85	3·70	3·66	3·92	4·00	3·80	3·68	3·61	3·68	3·53	3·16		2,487	3·71
·60	·72	·54	·38	·53	·43	·50	·45	·40	·44	·31	·42	·36	·42	?	199	·29
3·57	3·62	3·71	3·69	3·69	3·71	3·76	3·79	3·74	3·62	3·58	3·44	3·30	3·10	?	2,438	3·60

Assumed zero in computing Discharge.

Digitized by Google

MEAN VELOCITIES

Solání Right

[*Instruments*—1"

Serial No.	1	2					3			4				5				
	Date, 1876-77-78.	Depth.			Surface-Breadth.	Length of Rod.	Fall of Water-Surface.			Wind.				Timekeeper's Initial.	Mean past [Each Velocity			
		Central.	Variation.	Hyd. Mean.			Upper 5 miles.	Lower 4½ miles.	Local Slope.	From		To			Zero in computing D.	Left of		
		H		R	b	l	F_1	F_2	S	Direction.	Velocity.	Direction.	Velocity.			42½	41½	40
115.	9-10-'77	7·80	·00	6·63	84·4	7	6·10	4·10	1 98	..	0	..	0	G	?o	?	3·21	3·85
Series 116.	27-3-'77	7·56	+ ·02	6·46	84·5	7	5·84	4·01	?	N	5	NW	4	W		?	2·75	3·31
	9-3-'78	·55	·00	·45	·5	7	5·90	3·95	203	V	*l*	..	0	T		2·73	3·23	3·33
	7-3- „	·50	·00	·41	·5	7	5·90	3·90	213	V	*l*	S	7	T		2·94	3·19	3·33
	8-3- „	·50	·00	·41	·5	7	5·95	3·90	205	NW	6	NW	*l*	R		3·19	3·23	3·33
	11-3- „	·50	·00	·41	·5	7	5·95	3·90	205	..	0	..	0	R		3·19	3·03	3·37
	21-2-'77	·45	+ ·06	·38	·5	7	6·05	3·95	?	V	*g*	V	*g*	P		?	3·05	3·31
	8-11- „	·40	·00	·34	·5	7	6·05	2·90	210	V	*l*	V	13	G		2·94	3·00	3·41
	δ Range,	·16	..	·12	·0	0	·21	1·11	?010	..	..	..	..	..	?	?·46	·48	·10
	v Means of 7,	7 49	..	6·41	84·5	7	5·95	3·79	?207	NW *b* W 1				..	?	?3·00	3·07	3·34
117.	5-11-'77	7·10	·00	6·15	85·0	6½	6·00	2·60	209	E	4	N	6	G	?o	?	3·13	3·31
	21-7-'78	·08	+ ·05	·13	·0	6	6·12	3·78	230	..	0	..	0	H	?o	2·93	3·00	3·61
	δ Range,	·02	..	·02	·0	·5	·12	1·18	021	..	..	..	..	..	?	?	·13	·30
	v Means of 2,	7·09	..	6·14	85·0	6·3	6·06	3·19	220	NE *b* N 2				..	?	?2·93	3·07	3·46
Series 118.	19-7-'76	6·86	− ·02	5·97	85·0	6	5·99	3·56	230	..	0	NNE	7	H			3·14	3·23	3·59
	14-1-'78	·68	·00	·83	·0	6	6·02	3·08	224	..	0	..	0	P			2·86	3·03	3·37
	„ „	·69	+ ·01	·84	·0	6	6·01	3·09	224	..	0	SW	4	G			2·88	2·99	3·31
	„ „	·69	·00	·84	·0	6	„	„	„	S	8	S	8	P			2·88	3·06	3·39
	16-1- „	·68	·00	·83	·0	6	5·97	3·08	?	NW	8	S	8	G			2·63	3·09	3·39
	„ „	·68	·00	·83	·0	6	„	„	?	S	8	S	9	P			2·52	2·73	3·16
	„ „	·68	·00	·83	·0	6	„	„	?	S	9	S	10	G			2·91	2·96	3·47
	12-1- „	·67	·00	·83	·0	6	5·93	3·07	215	E	7	N	8	P			3·00	3·11	3·39
	„ „	·67	− ·03	·83	·0	6	„	„	„	S	4	V	*l*	G			2·88	3·21	3·43
	20-7-'76	·65	·00	·81	·0	6	6·05	3·45	230	..	0	N	9	W			2·94	3·11	3·43
	11-12-'77	·65	·00	·81	·0	6	5·95	3·25		V	5	V	3	G			2·94	3·13	3·37
	„ „	·65	·00	·81	·0	6	„	„		V	3	V	8	P			3·03	3·11	3·19
	„ „	·65	·00	·81	·0	6	„	„		V	8	SW	16	G			2·97	3·13	3·33
	17-1-'78	·63	·00	·80	·0	6	6·02	3·33		S	9	S	10	P			2·86	3·03	3·09
	„ „	·63	·00	·80	·0	6	„	„		S	10	S	13	G			2·70	3·05	3·39
	„ „	·63	·00	·80	·0	6	„	„	Not observed.	S	13	S	8	P			2·80	2·93	3·19
	δ Range,	·23	..	·17	·0	0	·12	·49	?015	..	..	..	..	..	?	·62	·50	·55
	v Means of 16,	6·67	..	5·83	85·0	6	5·99	3·21	?223	S 4				..	?	2·87	3·06	3·34
Series 119.	25-7-'76	6·30	·00	5·55	85·0	6	6·40	3·10	240	..	0	..	0	H			3·17	3·41
	16-10-'78	·24	+ ·02	·50	·0	5½	6·36	2·09	180	..	0	..	0	P			3·30	3·35	3·77
	24-7-'76	·13	+ ·05	·41	·0	5	6·47	2·93	270	NE	10	..	0	W			3·06	3·19	3·73
	9-7-'78	·13	+ ·25	·41	·0	5½	6·97	2·93	313	..	0	..	0	R			3·19	3·31	3·66
	15-10- „	·13	− ·05	·41	·0	5½	6·42	1·98	188	..	0	..	0	R			3·30	3·37	3·82
	10-7- „	·11	+ ·15	·40	·0	5½	6·79	2·41	273	N	6	V	15	P			2·88	2·90	3·30
	26-7-'76	·00	·00	·32	·0	5	6·30	2·80	250	..	0	..	0	H			3·01	3·31	3·70
	δ Range,	·30	..	·23	·0	·5	·67	1·12	133	..	..	..	..	..	?	?·42	·47	·52
	v Means of 7,	6·15	..	5·43	85·0	5·4	6·53	2·61	245	NNE 1				..	?	?3·29	3·23	3·63

Assumed zero in computing Discharge.

Digitized by Google

AND CUBIC DISCHARGES. **TABLE XXXIX.**

AQUEDUCT.

tin Tube-Rods].

6															7	8
VELOCITIES each vertical.															CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
is the mean of three observations].																
centre.						Centre.	Right of centre.									
37½	35	32½	30	20	10		10	20	30	32½	35	37½	39½	42½	D	V
4·00	4·00	4·05	4·11	4·08	4·11	3·95	3·90	3·90	3·95	3·75	3·57	3·61	3·41	?0	2,561	3·86
3·66	3·64	3·68	3·80	3·23	3·70	3·68	3·64	3·73	3·59	3·61	3·37	3·13	3·16		2.126	3·49
3·61	3·57	3·57	3·53	3·66	3·61	4·00	3·75	3·90	3·75	3·66	3·45	3·26	2·97		2,349	3·66
3·70	3·57	3·49	3·66	3·66	3·75	3·57	3·80	3·66	3·70	3·49	3·37	3·33	3·16		2,256	3·53
3·45	3·70	3·66	3·57	3·80	3·66	3·80	3·70	3·70	3·66	3·41	3·49	3·33	3·26		2,296	3·60
3·49	3·61	3·66	3·53	3·66	3·95	3·90	3·95	3·61	3·70	3·45	3·53	3·45	3·23		2,305	3·62
3·49	3·68	3·66	3·70	3·85	3·95	3·85	3·75	3·82	3·49	3·47	3·39	3·41	3·03		2,325	3·57
3·61	3·61	3·85	3·70	3·73	3·82	3·75	3·97	3·68	3·47	3·49	3·53	3·33	3·19	Zero in computing D.	2,269	3·61
·25	·13	·36	·27	·62	·34	·43	·33	·29	·28	·25	·16	·32	·29	?	223	·17
3·57	3·63	3·65	3·64	3·66	3·78	3·79	3·79	3·73	3·62	3·51	3·45	3·32	3·14	?	2,275	3·59
3·59	3·70	3·80	3·77	3·80	3·53	3·80	3·95	3·61	3·41	3·47	3·41	3·47	2·97	?0	2,172	3·60
3·80	3·85	4·05	4·08	3·92	3·95	3·82	3·95	3·80	3·61	3·59	3·39	3·39	3·16	?0	2,245	3·73
·21	·15	·25	·31	·12	·42	·02	·00	·19	·20	·12	·02	·08	·19	?	73	·13
3·70	3·78	3·93	3·93	3·86	3·74	3·81	3·95	3·71	3·51	3·53	3·40	3·43	3·07	?	2,208	3·67
3·85	3·97	3·82	3·97	3·70	4·00	3·92	3·95	3·75	3·57	3·68	3·45	3·45	3·00		2,157	3·70
3·51	3·66	3·45	3·70	3·73	3·77	3·66	3·75	3·49	3·70	3·53	3·43	3·24	2·97		2,002	3·53
3·51	3·64	3·59	3·66	3·73	3·59	3·73	3·85	3·64	3·49	3·37	3·31	3·26	3·08		2,020	3·55
3·45	3·70	3·68	3·68	3·73	3·70	3·61	3·68	3·73	3·66	3·51	3·43	3·16	2·96		2,021	3·55
3·55	3·53	3·68	3·64	3·75	3·73	3·85	3·68	3·73	3·57	3·47	3·41	3·23	2·84		2,043	3·60
3·66	3·57	3·59	3·61	3·73	3·68	3·70	3·61	3·73	3·66	3·35	3·33	3·06	2·91		2,013	3·54
3·49	3·70	3·61	3·64	3·75	3·77	3·57	3·73	3·70	3·49	3·51	3·47	3·43	3·17		2,019	3·56
3·55	3·57	3·87	3·64	3·82	3·43	3·85	3·75	3·61	3·64	3·51	3·49	3·26	2·99		2,044	3·61
3·68	3·80	3·75	3·73	3·82	3·64	3·70	3·73	3·80	3·73	3·49	3·43	3·31	2·99		2,057	3·63
3·73	3·75	3·77	3·85	3·77	3·77	3·80	3·68	3·68	3·55	3·53	3·33	3·17	?		2,029	3·59
3·80	3·70	3·75	3·45	3·61	3·87	3·61	3·66	3·85	3·70	3·66	3·45	3·24	3·09		2,030	3·59
3·85	3·51	3·66	3·77	3·68	3·90	3·97	3·82	3·85	3·59	3·59	3·59	3·23	2·99		2,077	3·67
3·57	3·70	3·53	3·68	3·82	3·85	3·75	3·77	3·68	3·66	3·55	3·49	3·23	3·03		2,031	3·59
3·64	3·47	3·61	3·77	3·68	3·85	3·75	3·85	3·57	3·53	3·43	3·47	3·31	3·01		2,009	3·57
3·43	3·53	3·66	3·73	3·66	3·75	3·82	3·77	3·68	3·73	3·39	3·39	3·21	2·99		2,016	3·58
3·41	3·55	3·59	3·61	3·77	3·68	3·82	3·57	3·73	3·57	3·57	3·43	3·49	2·83		2,024	3·59
·44	·50	·42	·52	·21	·57	·40	·38	·36	·24	·33	·28	·43	?·34	?	155	·17
3·61	3·65	3·66	3·70	3·73	3·75	3·76	3·74	3·70	3·62	3·51	3·43	3·27	?2·99	?	2,037	3·59
3·66	3·82	3·77	3·80	3·66	3·77	3·77	3·57	3·66	3·43	3·49	3·19	3·19	2·91		1,908	3·56
3·92	3·97	4·17	3·95	4·00	4·17	3·82	3·90	3·61	3·61	3·45	3·43	3·23	3·21		1,974	3·72
3·95	3·97	4·03	4·03	3·97	4·00	4·00	3·97	3·82	3·68	3·73	3·33	3·24	3·16		1,977	3·79
3·95	4·05	4·11	4·29	4·29	4·29	4·00	4·22	4·22	4·22	4·00	3·95	3·90	3·55		2,107	4·04
3·85	3·95	4·03	3·90	4·05	4·11	4·03	3·77	3·68	3·59	3·49	3·35	3·23	3·09		1,963	3·77
3·55	3·53	3·45	3·75	3·75	3·80	3·87	3·68	3·75	3·68	3·55	3·53	3·41	3·23		1,887	3·63
3·66	3·73	3·87	3·87	3·92	3·87	3·75	3·75	3·73	3·55	3·49	3·31	3·28	2·91		1,864	3·65
·40	·52	·72	·54	·63	·52	·28	·65	·61	·79	·55	·76	·71	·64	?	243	·48
3·79	3·86	3·92	3·94	3·95	4·00	3·89	3·84	3·78	3·68	3·60	3·44	3·35	3·15	?	1,954	3·74

Digitized by Google

MEAN VELOCITIES

Soláni Right

[*Instruments*—*Nos.* 120 *to* 126. 1″ *tin Tube-Rods.*

Serial No.	1 Date, 1876-77-78.	2 Depth. Central. H	Variation.	Hyd. Mean. R	Surface-Breadth. b	Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_2	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Mean past [Each Velocity Left of 42½	41⅞	41¼	40
Series 120.	13-10-'77	5·93	+·05	5·26	85·0	5½	5·77	1·93	Not observed.	SSW	4	SSW	4	P	Zero in computing D.	?	2·69	3·03
	" "	·86	+·08	·21	·0	5½	5·84	1·86		S	4	SSW	4	G		?	2·73	2·86
	" "	·85	·00	·20	·0	5½	5·80	1·85		S	5	S	10	P		?	2·65	2·94
	" "	·84	+·03	·19	·0	5⅝	5·81	1·84		V	*l*	S	5	G		?	2·75	2·91
	29-1-'78	·75	·00	·12	·0	5	5·95	2·75		E	4	E	4	G		2·59	2·72	3·13
	12-10-'77	·77	·00	·14	·0	5⅛	5·93	2·47		NE	4	V	5	G		?	2·63	2 97
	" "	·76	−·02	·13	·0	5⅛	5·94	2·46		V	5	S	6	P		?	2·79	2·97
	" "	·63	−·05	·02	·0	5	5·97	2·33		E	5	WSW	10	G		?	2·86	3·16
	" "	·63	+·05	·02	·0	5	"	"		WSW	10	WSW	8	P		?	2·90	3·21
	δ Range,	·30	..	·24	·0	·5	·20	·91	..	..	..	..	..	..		?	?	·27	·35
	v Means of 9,	5·78	..	5·14	85·0	5·3	5·89	2·20	..	SSW 3				..		?	?2·59	2·75	3·02
121.	14-10-'78	5·63	·00	5·02	85·0	5	6·17	1·53	180	..	0	..	0	R	?o	2·78	2·99	3·28
	27-7-'76	·58	−·05	4·98	·0	5	6 32	3·08	300	..	0	S	6	W	?o	2·90	2·99	3·45
	δ Range.	·05	..	·04	·0	0	·15	1·55	120	..	..	..	..	..	?	·12	·00	·17
	v Means of 2,	5·61	..	5·00	85·0	5	6·25	2·31	240	S 2				..	?	2·84	2·99	3·37
Series 122.	22-12-'77	4·57	·00	4·17	85·0	4	5·63	1·77	Not observed.	E	8	V	5	P	Assumed zero in computing Discharge.	2·50	2·48	2·68
	" "	·57	·00	·17	·0	4	"	"		V	5	S	9	G		2·24	2·42	2·59
	" "	·57	·00	·17	·0	4	"	"		S	9	S	9	P		2·38	2·42	2·76
	" "	·57	·00	·17	·0	4	"	"		S	9	S	8	G		2·40	2·30	2·67
	" "	·57	·00	·17	·0	4	"	"		S	8	V	7	P		2·40	2·40	2·58
	" "	·57	·00	·17	·0	4	5·68	"		V	*l*	S	5	G		2·33	2·47	2·56
	24-12- "	·49	+·03	·10	·0	4	5·61	1·79	195	..	0	S	8	P		2·34	2·33	2·61
	" "	·45	+·05	·07	·0	4	5·65	1·75	195	S *b* W	7	..	0	G		2·24	2·34	2·55
	" "	·42	·00	·05	·0	4	5·68	1·72	203	S	6	S *b* W	7	P		2·31	2·33	2·62
	19-12- "	·40	·00	·03	·0	4	5·65	1·70	218	SW	4	S	19	G		2·11	2·35	2·48
	23-8-'78	·43	+·05	·05	·0	4	6·37	2·23	243	N	7	E	8	P		2·27	2·51	2·87
	" "	·35	+·05	3·99	·0	3½	6·05	1·95	260	..	0	N	5	R		2·38	2·76	3·03
	22-7-'76	·33	·00	·97	·0	4	6·87	?1·73	330	S	6	SE	4	H		?	2·86	3·05
	δ Range,	·24	..	·20	·0	·5	1·26	?·53	?135	..	..	..	..	..	?	?·39	·56	·57
	v Means of 13,	4·48	..	4·10	85·0	4·0	5·82	?1·81	?235	S *b* E 5				..	?	?2·33	2·46	2·70
123.	17-10-'77	3·65	·00	3·40	85·0	3	4·30	·05	?	..	0	..	0	G	?o	?	·61	·62
124.	31-7-'76	3·49	−·12	3·26	85·0	3	6·61	1·29	195	..	0	N	9	W	?o	?	2·20	2·32
125.	16-7-'78	2·02	−·04	1·95	85·0	1½	7·78	·42	203	S	*l*	S	*l*	P	?o	1·23	1·36	1·45
126.	11-7-'78	1·92	−·24	1·85	85·0	1½	5·93	? −·38	?	S	6	S	5	R	?o	1·08	1·16	1·12
127.	11-7-'78	·70	·0	·69	84·3	½	7·40	?	113	S	11	S	8	P	?o	·47	·51	·55

Digitized by Google

AND CUBIC DISCHARGES. TABLE XL.

AQUEDUCT.

No. 127. 1″ *wood Rods*].

6															7	8
VELOCITIES each vertical. is the mean of three observations].															CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
centre.						Centre.	Right of centre.									
37½	35	32½	30	20	10		10	20	30	32½	35	37½	39½	42½	D	V
3·17	3·30	3·16	3·00	3·17	3·23	3·28	3·33	3·35	2·93	3·11	3·01	2·83	2·80		1,577	3·13
3·06	3·08	3·13	3·13	3·05	3·26	3·35	3·23	3·23	3·13	3·14	3·14	2·86	2·80		1,553	3·12
3·26	3·19	3·08	3·03	3·26	3·01	3·35	3·19	3·41	3·30	3·11	3·06	3·05	2·82		1,582	3·18
3·03	3·19	3·26	3·19	3·37	3·23	3·26	3·37	3·37	3·30	3·30	3·06	2·73	2·73		1,583	3·19
3·47	3·61	3·64	3·73	3·57	3·70	3·66	3·61	3·57	3·24	3·37	3·33	3·11	2·88		1,693	3·46
3·30	3·53	3·33	3·37	3·30	3·09	3·37	3·37	3·41	3·41	3·33	3·13	3·33	2·97		1,602	3·27
3·06	3·30	3·37	3·08	3·17	3·19	3·33	3·59	3·28	3·19	3·26	3·14	2·99	3·01		1,555	3·18
3·26	3·45	3·41	3·49	3·45	3·45	3·33	3·53	3·37	3·26	3·16	3·13	2·80	2·88		1,565	3·27
3·30	3·41	3·39	3·23	3·35	3·28	3·24	3·39	3·43	3·26	3·23	3·14	3·00	3·03		1,550	3·24
·44	·53	·56	·73	·52	·69	·42	·42	·34	·48	·26	·32	·60	·30	?	143	·34
3·21	3·34	3·31	3·25	3·30	3·27	3·35	3·40	3·38	3·22	3·22	3·13	2·97	2·88	?	1,584	3·23
3·47	3·57	3·53	3·53	3·70	3·66	3·39	3·55	3·45	3·45	3·33	3·16	3·06	2·83	?o	1,627	3·40
3·41	3·53	3·55	3·53	3·64	3·55	3·75	3·59	3·49	3·28	3·31	3·09	2·94	2·82	?o	1,639	3·46
·06	·04	·02	·00	·06	·11	·36	·04	·04	·17	·02	·07	·12	·01	?	12	·06
3·44	3·55	3·54	3·53	3·67	3·61	3·57	3·57	3·47	3·37	3·32	3·13	3·00	2·83	?	1,633	3·43
2·69	2·78	2·75	2·82	2·88	2·93	2·90	2·76	2·86	2·79	2·78	2·65	2·58	2·31		1,076	2·77
2·72	2·88	2·97	3·16	2·88	2·88	2·86	3·03	2·91	2·91	2·86	2·75	2·60	2·26		1,092	2·81
2·78	2·83	2·91	2·94	3·06	2·99	3·06	2·87	2·96	2·94	2·79	2·80	2·53	2·30		1,120	2·88
2·75	2·83	2·86	2·78	2·97	3·08	2·91	3·05	2·91	2·86	2·90	2·73	2·62	2·34		1,099	2·83
2·84	2·79	2·90	2·90	2·99	2·87	3·01	2·94	2·91	2·76	2·80	2·69	2·60	2·43		1,104	2·84
2·74	2·86	2·87	2·99	2·84	2·96	3·05	3·06	2·94	2·80	2·65	2·91	2·69	2·27		1,102	2·84
2·67	2·76	2·82	2·69	2·69	2·67	2·91	2·74	2·86	2·60	2·61	2·53	2·35	2·17		1,027	2·69
2·69	2·55	2·80	2·64	2·72	2·96	2·96	2·86	2·84	2·53	2·73	2·70	2·62	2·10		1,080	2·72
2·75	2·76	2·76	2·78	2·94	2·80	2·82	2·80	2 87	2·61	2·76	2·60	2·46	2·22		1,031	2·74
2·60	2·75	2·65	2·74	2·68	2·63	2·84	2·83	2·97	3·00	2·87	2·84	2·67	2·45		1,024	2·74
3·09	3·33	3·51	3·45	3·33	3·43	3·43	3·39	3·39	3·16	3·14	2·93	2·82	2·62		1,219	3·24
3·30	3·47	3·55	3·41	3·51	3·51	3·57	3·53	3·45	3·28	3·13	3·06	2·96	2·60		1,237	3·35
3·23	3·41	3·16	3·13	3·39	3·53	3·37	3·55	3·41	3·57	3·41	3·30	3·16	3·14		1,214	3·30
·70	·92	·90	·81	·83	·90	·75	·81	·61	1·04	·80	·77	·81	1·04	?	213	·66
2·83	2·92	2·96	2·96	2·99	3·02	3·05	3·03	3 02	2·91	2·88	2·81	2·67	2·40	?	1,106	2·90
·70	·65	·69	·68	·67	·73	·72	·78	·78	·76	·75	·72	·73	·63	?o	218·9	·71
2·44	2·61	2·53	2·46	2·47	2·53	2·60	2·65	2·52	2·44	2·21	2·25	2·17	2·03	?o	722·2	2·43
1·43	1·49	1·58	1·46	1·46	1·55	1·65	1·90	1·88	1·84	1·76	1·71	1·60	1·43	?o	276·9	1·61
1·21	1·17	1·19	1·21	1·21	1·16	1·20	1·35	1·46	1·42	1·38	1·24	1·17	·99	?o	202·8	1·24
·55	·58	·53	·53	·54	·56	·57	·66	·77	·78	·67	·65	·49	·44	?o	85·6	·60

Assumed zero in computing Discharge.

Zero in computing D.

Digitized by Google

MEAN VELOCITIES

Solání Right Aqueduct,

[*Instrument*—1″

Serial No.	1 Date, 1876-77-78.	2 Depth. Central. H	Variation.	Hyd. Mean. R	Surface-Breadth. b	Length of Rod. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_2	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Mean past [Each Velocity Left of 42½	41⅞	41¼	40
131.	27-10-'77	4·60	·00	4·20	85·0	4	3·60	·10	024	..	0	SW	6	G	?o	?	·84	1·01
	„ „	·60	·00	·20	·0	4	„	„	026	SW	6	NE	5	P	?o	?	1·00	1·03
δ	Range,	·00	..	·00	·0	0	·00	·00	002	..	..	..	..	..	?	?	·16	·02
v	Means of 2,	4·60	..	4·20	85·0	4	3·60	·10	025	SW 2				..	?	?	·92	1·02
132.	1-9-'76	3·98	−·04	3·67	85·0	3	6·17	·98	480	..	0	..	0	H	?o	?	4·05	3·97
	„ „	·93	−·05	·63	·0	3	„	·93	465	..	0	..	0	W	?o	?	3·55	4·00
δ	Range,	·05	..	·04	·0	0	·00	·05	015	..	..	..	..	..	?	?	·50	·03
v	Means of 2,	3·96	..	3·65	85·0	3	6·17	·96	473	Calm				..	?	?	3·80	3·99
133.	18-10-'77	3·60	·00	3·35	85·0	3	4·35	·00	?	NE	5	V	4	P	?o	?	·61	·65
134.	31-8-'76	3·58	+·06	3·33	85·0	3	6·22	·88	?	SSW	10	SW	9	W	?o	?	2·08	2·27
135.	21-9-'78	3·18	+·05	2·99	85·0	2½	6·22	·68	253	..	0	..	0	P	?o	1·96	2·16	2·21
136.	21-9-'78	3·12	+·03	2·94	85·0	2½	6·28	·62	208	..	0	..	0	R	?o	1·88	2·27	2·27
137.	31-8-'76	3·13	+·10	2·94	85·0	3	6·47	·43	200	..	0	SW	12	H	?o	?	1·90	2·11
138.	31-8-'76	2·88	+·05	2·72	85·0	2	6·52	·18	145	..	0	..	0	W	?o	?	2·07	2·13
139.	20-9-'78	2·71	−·02	2·57	85·0	2	5·89	·21	168	NW	*l*	V	*l*	R	?o	1·44	1·61	1·81
	„ „	·60	·00	2·47	·0	2	6·00	·10	133	V	*l*	S	5	P	?o	1·28	1·17	1·36
δ	Range,	·11	..	·10	·0	0	·11	·11	035	..	..	..	..	..	?	·16	·44	·45
v	Means of 2,	2·66	..	2·52	85·0	2	5·95	·16	151	S 1				..	?	1·36	1·39	1·59

Digitized by Google

AND CUBIC DISCHARGES. **TABLE XLI.**

[LEFT AQUEDUCT CLOSED].

tin Tube-Rods].

6															7	8
VELOCITIES each vertical. is the mean of three observations].															CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
centre.						Centre.	Right of centre.									
37½	35	32½	30	20	10		10	20	30	32½	35	37½	39½	42½	D	V
1·03	1·14	1·13	1·05	1·17	1·19	1·29	1·36	1·32	1·35	1·35	1·32	1·19	1·12	?o	472·2	1·21
1·13	1·08	1·14	1·12	1·21	1·23	1·37	1·43	1·38	1·33	1·38	1·32	1·21	1·14	?o	491·7	1·26
·10	·06	·01	·07	·04	·04	·08	·07	·06	·02	·03	·00	·02	·02	?	19·5	·05
1·08	1·11	1·14	1·09	1·19	1·21	1·33	1·40	1·35	1·34	1·37	1·32	1·20	1·18	?	481·9	1·24
4·22	4·32	4·65	4·76	4·92	5·22	5·17	5·50	5·36	5·00	5·00	4·84	4·35	3·80	?o	1,648	4·87
3·87	4·20	4·41	4·51	5·00	5·22	5·13	5·13	5·26	4·84	5·00	4·65	4·20	3·77	?o	1,597	4·78
·35	·12	·24	·25	·08	·00	·04	·37	·10	·16	·00	·19	·15	·03	?	51	·09
4·05	4·26	4·53	4·64	4·96	5·22	5·15	5·32	5·31	4·92	5·00	4·75	4·28	3·79	?	1,628	4·83
·71	·65	·63	·65	·65	·64	·71	·79	·77	·73	·77	·74	·73	·65	?o	212·0	·69
2·27	2·70	2·83	2·93	3·19	3·49	3·70	3·59	3·51	3·51	3·39	3·11	2·79	2·78	?o	979·3	3·22
2·55	2·61	2·82	3·01	3·30	3·49	3·57	3·30	3·47	3·43	3·19	3·14	3·00	2·70	?o	865·6	3·20
2·16	2·43	2·53	2·65	2·91	3·33	3·19	3·00	3·06	3·06	3·13	3·06	2·97	2·42	?o	740·2	2·79
2·05	2·20	2·26	2·26	2·31	2·56	2·68	2·91	2·94	2·90	2·68	2·65	2·28	2·15	?o	667·8	2·51
2·11	2·35	2·31	2·34	2·47	2·61	2·76	2·94	2·83	2·74	2·70	2·43	2·26	1·95	?o	620·7	2·54
1·69	1·72	1·88	1·94	2·14	2·33	2·56	2·56	2·61	2·50	2·52	2·40	2·29	2·04	?o	525·6	2·28
1·66	1·52	1·65	1·74	2·07	2·39	2·37	2·43	2·33	2·35	2·26	2 26	2·18	1·90	?o	467·0	2·11
·03	·20	·23	·20	·07	·06	·19	·13	·28	·15	·26	·14	·11	·14	?	58·6	·17
1·68	1·62	1·77	1·84	2·11	2·36	2·47	2·50	2·47	2·43	2·39	2·33	2·24	1·97	?	496·3	2·20

Digitized by Google

MEAN VELOCITIES

Solání Embankment

[*Instrument*—1″

Serial No.	Date, 1876-77-78-79.	1	2 Depth. Above Datum. h	Variation.	Central. H	Solání Aqueduct Gauge.	Hyd. Mean. R	Surface-Breadth. b	3 Fall of Water-Surface. Upper 4 miles. F_1	1 mile below Site. F_2	Lower 4½ miles. F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Left Steps immersed. Top	q	m	Last
Series 151.	14-12-'78		10·04	−·05	11·07	10·03	9·87	171·0	4·74	1·18	5·60	230	E	7	..	0	A	·46	2·61	3·09	3·23
	18-12- „		9·95	−·01	10·98	9·88	·36	169·8	4·68	1·24	5·48	225	S	5	E	7	P	1·78	2·68	2·79	3·41
	19-12- „		·93	−·01	·96	·82	·34	·8	4·70	1·28	5·42	223	E δ S	8	E	12	P	1·74	2·58	2·91	3·28
	„ „		·91	+·04	·94	·80	·33	·8	4·72	„	5·40	228	E	4	E δ S	8	A	1·84	2·74	2·94	3·33
	20-12- „		·88	−·01	·91	·80	·30	·8	4·65	1·25	5·40	228	S	3	W	10	A	1·67	2·61	2·91	3·31
	δ Range,		·16	..	·16	·23	·07	1·2	·09	·10	·20	007	..	..	..	..	..	1·38	·16	·30	·18
	v Means of 5,		9·94	..	10·97	9·87	9·34	170·1	4·70	1·25	5·46	227	ESE 4				..	1·50	2·64	2·93	3·31
Series 152.	29-5-'78		10·03	−·07	11·20	9·98	9·23	171·0	4·70	1·22	5·53	213	W	8	..	0	G	·58	2·48	3·00	3·14
	21-12-'76		9·98	−·01	·16	10·00	·19	·0	4·80	1·15	5·95	?	E	5	SE	5	W	1·75	2·86	3·13	3·31
	22-12- „		·98	·00	·16	·00	·19	·0	4·80	1·15	5·95	205	E	5	W	8	P	1·94	2·86	3·13	3·19
	„ „		·98	·00	·16	·00	·19	·0	„	„	„	„	W	8	W	16	W	1·90	2·82	3·26	3·73
	15-12- „		·97	·00	·15	·00	·19	·0	4·81	1·14	5·95	198	SW	9	S	23	P	1·86	2·75	3·13	3·21
	19-12- „		·97	−·01	·15	·05	·19	·0	4·81	1·09	5·90	203	..	0	SW	17	W	1·73	2·70	3·01	3·33
	16-12- „		·96	+·02	·14	·05	·18	·0	4·82	1·08	5·90	200	ENE	12	E δ S	14	W	2·06	2·62	2·93	3·13
	18-12- „		·95	·00	·13	·00	·23	·0	4·83	1·12	5·95	200	E	17	E	18	P	1·18	2·63	3·08	3·23
	20-12- „		·95	+·01	·13	·00	·23	·0	4·83	1·12	5·95	194	E	23	S	4	P	1·88	2·47	2·94	3·08
	28-12- „		·89	+·03	·07	9·80	·18	169·8	4·74	1·26	6·00	214	..	0	..	0	P	1·80	2·46	3·08	3·00
	„ „		·91	+·02	·09	·80	·20	·8	4·72	1·28	„	„	..	0	W	11	W	1·85	2·54	3·16	3·09
	14-12- „		·87	+·02	·05	·95	·17	·8	4·81	1·09	5·90	207	SW	11	SW	25	W	1·65	2·86	3·11	3·19
	26-12- „		·85	+·01	·03	·84	·15	·8	4·78	1·18	5·96	?	SE	4	E	13	P	1·67	2·73	3·06	3·16
	„ „		·85	·00	·03	·85	·15	·8	4·78	1·17	5·95	?	E	9	SE	5	W	1·70	2·61	2·97	3·08
	29-12- „		·82	+·03	·00	·80	·13	·8	4·76	1·19	5·95	213	..	0	..	0	P	1·70	2·73	3·11	3·30
	9-12- „		·77	·00	10·95	·85	·08	168·7	4·81	1·09	5·90	?	..	0	S	5	W	1·52	2·74	2·61	2·90
	12-12- „		·77	·00	·95	·85	·08	·7	4·81	1·09	5·90	?	S δ E	7	SW	13	P	1·69	2·64	2·76	3·39
	δ Range,		·26	..	·25	·25	·15	2·3	·13	·20	·10	?024	..	..	..	..	..	1·48	·40	·65	·83
	v Means of 17,		9·91	..	11·09	9·93	9·17	170·3	4·79	1·15	5·94	?206	S δ E 3				..	1·67	2·68	3·03	3·20
Series 153.	6-1-'77		9·71	·00	10·89	9·60	9·09	168·7	4·72	1·28	5·30	?	E	9	SE	6	W	1·64	2·73	3·30	2·83
	8-12-'76		·57	·00	·75	·65	8·98	·7	4·81	1·09	5·45	203	..	0	S	8	P	1·28	2·37	2·84	3·03
	28-5-'78		·50	−·01	·68	·44	·92	·7	4·73	1·23	5·14	243	W	7	W	9	G	1·24	2·31	2·75	3·21
	12-4- „		·47	·00	·65	·43	·90	·7	4·76	1·21	4·73	205	E	8	E	8	G	1·16	2·22	2·69	2·88
	27-5- „		·45	−·01	·63	·38	·88	·7	4·68	1·24	5·08	220	V	*l*	V	*g*	P	·99	2·18	2·51	2·93
	15-4-'79		·43	+·15	·46	·38	9·00	·7	4·60	1·22	5·23	265	W	9	W	25	P	·85	2·20	2·51	2·99
	δ Range,		·28	..	·43	·27	·21	·0	·21	·19	·72	?062	..	..	..	..	..	·79	·55	·79	·38
	v Means of 6,		9·52	..	10·68	9·48	8·96	168·7	4·72	1·21	5·16	?227	SW δ W 2				..	1·19	2·34	2·77	2·98

Digitized by Google

AND CUBIC DISCHARGES. **TABLE XLII.**

MAIN SITE.

tin Tube-Rods].

6																7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations].																CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
of centre.						Centre.	Right of centre.						Steps immersed.						
74½	70	65	60	40	20		20	40	60	65	70	74½	Last	m	q	Top	D	V
3·23	3·55	3·87	3·80	3·80	4·41	4·55	4·29	4·51	3·70	3·80	3·45	3·16	3·06	2·97	2·40	·99	7,364	4·09
3·01	3·61	3·92	3·70	4·26	4·20	4·41	3·92	4·41	3·87	3·61	3·53	3·03	3·03	2·99	2·41	1·38	7,344	4·11
3·21	3·64	3·90	3·45	4·26	4·05	3·87	4·29	4·05	3·82	3·64	3·73	3·16	3·19	3·31	2·52	·95	7,002	3·93
3·09	3·30	3·85	3·77	4·08	4·11	4·41	4·26	4·29	3·68	3·53	3·61	3·13	3·16	3·09	2·34	·90	7,197	4·04
3·09	3·59	3·61	3·45	3·85	4·00	4·17	4·41	4·22	3·92	3·39	3·33	3·00	3·01	2·83	2·26	·94	6,940	3·91
·22	·34	·31	·35	·46	·41	·68	·49	·46	·24	·41	·40	·16	·18	·48	·26	·48	424	·20
3·13	3·54	3·83	3·63	4·05	4·15	4·28	4·23	4·30	3·80	3·59	3·53	3·10	3·09	3·04	2·39	1·03	7,170	4·02
2·90	3·47	3·53	3·53	3·85	3·68	3·64	4·17	4·00	3·75	3·77	3·11	2·99	3·08	3·09	2·35	·97	6,590	3·91
3·11	3·33	3·64	3·53	3·68	4·11	3·92	4·17	4·29	3·80	3·37	3·47	2·97	3·14	3·17	2·48	1·36	6,764	3·83
2·97	3·47	3·70	3·82	4·05	3·75	4·22	4·08	4·00	3·77	3·57	3·73	2·99	3·16	3·03	2·43	1·35	6,934	3·93
3·05	3·55	3·87	3·68	3·87	4·00	4·05	4·05	4·05	3·73	3·85	3·43	3·05	3·03	3·16	2·36	1·35	6,849	3·88
3·21	3·51	3·68	3·66	3·85	3·82	3·97	4·03	3·97	3·85	3·51	3·57	2·86	3·31	3·30	2·39	1·27	6,746	3·82
2·94	3·47	3·90	3·59	4·03	4·20	3·95	3·92	4·14	3·92	3·73	3·33	2·96	3·28	2·94	2·63	1·09	6,851	3·88
2·97	3·47	3·53	3·57	3·75	3·75	4·20	4·20	4·08	3·66	3·64	3·30	3·09	3·16	3·31	2·21	·97	6,776	3·84
2·99	3·43	3·68	3·57	4·14	3·75	4·05	4·08	4·32	3·82	3·64	3·43	2·97	3·31	3·03	2·60	1·08	6,927	3·93
2·84	3·53	3·41	3·39	3·95	3·87	3·87	3·90	4·08	3·73	3·49	3·53	2·91	3·23	3·14	2·46	1·16	6,684	3·80
3·08	3·51	3·51	3·41	4·08	3·95	4·11	3·90	4·05	3·85	3·68	3·24	2·94	3·14	2·94	2·50	·97	6,792	3·88
3·06	3·55	3·61	3·64	4·00	4·05	4·05	3·85	3·70	3·75	3·68	3·24	2·82	3·37	2·97	2·32	1·18	6,666	3·80
3·03	3·59	3·61	3·70	4·17	3·59	4·00	3·43	4·17	3·49	3·30	3·24	2·82	3·00	2·80	2·32	·90	6,738	3·86
2·90	3·49	3·77	3·59	3·92	4·25	3·87	3·87	3·87	3·80	3·19	3·26	2·94	3·19	3·28	2·34	·81	6,531	3·74
2·76	3·19	3·61	3·64	3·73	4·00	4·17	3·95	4·03	3·90	3·51	3·28	2·79	3·24	2·87	2·35	·76	6.729	3·86
2·97	3·49	3·61	3·37	3·75	4·38	3·75	3·55	3·82	3·35	3·53	3·51	2·94	3·11	3·06	2·51	·64	6,389	3·67
2·87	3·24	3·41	3·24	3·87	4·44	4·08	3·92	4·03	3·75	3·49	3·39	3·05	3·05	3·11	2·52	1·65	6,618	3·82
2·84	3·31	3·43	3·47	4·11	4·08	4·29	4·05	4·03	3·66	3·39	3·47	2·76	3·00	2·88	2·56	1·68	6,765	3·91
·45	·40	·49	·58	·49	·85	·65	·74	·62	·57	·66	·62	·33	·37	·51	·42	1·04	545	·26
2·97	3·45	3·62	3·55	3·93	3·97	4·01	3·95	4·04	3·74	3·55	3·38	2·93	3·16	3·06	2·43	1·13	6,725	3·83
3·01	3·43	3·61	3·53	3·97	3·90	3·97	4·14	4·11	3·47	3·37	3·24	3·05	3·19	3·45	2·75	2·06	6,598	3·84
2·97	3·47	3·24	3·05	3·70	4·17	4·00	3·75	3·95	3·66	3·17	3·28	2·78	3·06	2·88	2·68	1·47	6,294	3·70
2·65	3·19	3·47	3·13	3·75	4·00	3·77	3·55	3·97	3·66	3·64	3·30	2·74	3·13	2·80	2·44	1·71	6,187	3·67
2·63	3·19	3·49	3·33	3·61	4·05	3·87	3·82	3·85	3·70	3·55	3·41	2·70	3·26	3·30	2·75	1·90	6,162	3·67
2·69	3·17	3·61	3·47	3·75	4 00	3·85	3·61	4·08	3·61	3·47	3·11	2·84	3·01	2·73	2·44	1·63	6,231	3·72
3·05	3·30	3·59	3·45	3·70	3·82	3·82	4·03	3·64	3·57	3·61	3·37	2·91	3·00	2·80	2·45	1·48	6,185	3.64
·42	·30	·37	·48	·36	·35	·23	·59	·47	·23	·47	·30	·35	·26	·72	·31	·59	436	·20
2·83	3·29	3·50	3·66	3·75	3·99	3·88	3·82	3·93	3·61	3·47	3·29	2·84	3·11	2·99	2·59	1·71	6,276	3·71

Digitized by Google

MEAN VELOCITIES

Solání Embankment

[*Instrument*—1″

Serial No.	Date, 1876-77-78.	2 Depth. Above Datum. h	Variation.	Central. H	Solání Aqueduct Gauge.	Hyd. Mean. R	Surface-Breadth. b	3 Fall of Water-Surface. Upper 4 miles. F_1	1 mile below Site. F_2	Lower 4½ miles F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Left Steps immersed. Top	q	m	Last
Series 154.	4-12-'77	9·19	·09	10·37	8·95	8·73	167·5	4·74	1·41	4·80	?	S	4	S	9	G	1·65	2·14	2·75	2·88
	10-4-'78	·11	+·02	·29	9·00	·66	·5	4·62	1·28	4·90	215	V	*l*	..	0	G	1·67	2·08	2·56	3·03
	7-12- „	·08	+·01	·11	8·95	·77	·5	4·70	1·30	4·85	253	..	0	..	0	P	1·62	2·18	3·31	3·30
	6-12-'77	·02	+·06	·20	·90	·59	166·3	4·76	1·29	4·80	?	WNW	7	W	17	P	1·49	2·31	2·74	2·74
	7-12- „	·01	+ 01	·19	·88	·64	·3	4·72	1·30	4·78	220	S	9	W	7	G	1·34	2·22	2·78	3·09
	δ Range,	·18	..	·26	·12	·18	1·2	·14	·13	·12	?038	..	..	..	..	..	·33	·23	·75	·56
	v Means of 5,	9·08	..	10·23	8·94	8·68	167·0	4·71	1·32	4·83	?229	SW δ W 4				..	1·55	2·19	2·83	3·01
Series 155.	8-4-'78	8·82	+·05	10·00	8·70	8·49	166·3	4·61	1·29	4·75	215	V	*l*	W	6	P	·83	1·78	2·17	2·48
	28-10- „	·82	·00	9·66	·65	·48	·3	5·01	1·34	4·45	248	..	0	..	0	E	1·44	2·60	3·14	3·24
	4-4- „	·80	+·01	·98	·70	·47	·3	4·63	1·27	4·75	217	W	6	..	0	P	1·14	2·05	2·53	2·54
	6-4- „	·75	·00	·93	·67	·43	·3	4·68	1·25	4·74	215	W	6	W	6	G	·67	1·62	2·78	2·59
	29-3- „	·73	−·02	·91	·70	·41	·3	4·70	1·20	4·70	205	W	20	W	19	P	·59	1·79	2·40	2·75
	20-3- „	·53	−·21	·71	·48	·25	·3	4·70	1·22	4·48	199	SW	*l*	WSW	4	G	·47	1·78	1·95	2·33
	δ Range,	·29	..	·34	·22	·24	·0	·40	·14	·30	049	..	..	..	..	..	·97	·98	1·19	·91
	v Means of 6,	8·74	..	9·87	8·65	8·42	166·3	4·72	1·26	4·65	217	W 5				..	·86	1·94	2·46	2·66
156.	29-1-'77	8·44	+·05	9·62	7·55	8·23	165·2	3·94	2·06	3·95	223	ENE	11	..	0	P	1·55	1·97	2·16	2·35
	„ „	·47	−·92	·65	·58	·25	·2	3·91	„	3·98	„	..	0	E	7	W	1·45	1·67	2·36	2·53
	30-1- „	·41	·00	·59	·50	·21	·2	3·87	2·08	3·90	?	NNE	8	N	4	P	1·51	2·04	2·03	2·24
	„ „	·42	+ 01	·60	·50	·22	·2	3·86	2·09	„	?	N	4	SW	8	W	1·46	2·00	2·07	2·33
	δ Range,	·06	..	·06	·08	·04	·0	·08	·03	·08	?	..	..	..	..	..	·10	·37	·33	·29
	v Means of 4,	8·43	..	9·62	7·53	8·23	165·2	3·90	2·07	3·93	?	NE 3				..	1·49	1·92	2·14	2·36
Series 157.	21-3-'78	8·24	·00	9·41	8·18	8·11	164·0	4·59	1·23	4·38	204	SE	3	V	*l*	G	1·30	1·79	2·12	2·29
	20-1-'77	·15	·00	·32	7·95	·03	·0	4·63	1·37	4·15	?	W	8	W	9	P	1·27	1·90	2·36	2·48
	3-3- „	·13	·00	·30	8·05	·02	·0	4·65	1·25	4·35	228	S	4	..	0	W	1·42	1·91	2·30	2·45
	5-3- „	·10	·00	·27	·00	7·99	·0	4·63	1·27	4·30	?	N	4	N	4	P	1·13	2·06	2·26	2·68
	6-3- „	·08	+·01	·25	7·97	·98	·0	4·65	1·28	4·27	215	NW	10	..	0	W	1·28	1·54	2·03	2·60
	7-3- „	·07	·00	·24	·97	·97	·0	4·66	1·27	4·27	?	NW	4	SW	4	P	1·03	1·87	2·15	2·70
	12-3-'78	·05	·00	·22	·99	·95	·0	4·63	1·23	4·19	200	SE	6	SE	8	P	·96	1·69	1·83	2·30
	δ Range,	·19	..	·19	·23	·16	·0	·07	·14	·23	?028	..	..	..	..	..	·46	·52	·53	·41
	v Means of 7,	8·12	..	9·29	8·02	8·01	164·0	4·63	1·27	4·27	?212	W 1				..	1·20	1·82	2·15	2·50
158.	13-9-'76	7·95	+·28	9·13	7·95	7·88	164·0	4·73	1·17	4·35	215	..	0	W	17	H	?	1·95	2·40	2·74
	11-9- „	·85	−·03	·03	·70	·80	·0	4·88	1·32	4·10	215	..	0	E	4	H	·86	2·14	2·34	2·44
	δ Range,	·10	..	·10	·25	·08	·0	·15	·15	·25	000	..	..	..	..	..	?	·19	·06	·30
	v Means of 2,	7·90	..	9·08	7·83	7·84	164·0	4·81	1·25	4·23	215	W 3				..	?·86	2·05	2·37	2·59

Digitized by Google

AND CUBIC DISCHARGES.

TABLE XLIII.

MAIN SITE.

tin Tube-Rods].

6																7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations].																CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
of centre.						Centre.	Right of centre.						Steps immersed.						
74½	70	65	60	40	20		20	40	60	65	70	74½	Last	*m*	*q*	Top	D	V.
2·61	3·23	3·37	3·41	4·00	4·11	3·80	4·11	3·95	3·53	3·43	3·41	2·79	3·09	2·84	2·46	2·05	6,107	3·74
2·52	3·05	3·31	3·37	3·80	3·61	3·82	3·70	3·75	3·61	3·49	3·26	2·80	3·00	2·78	2·33	·81	5,869	3·68
3·17	3·66	3·61	3·45	3·73	3·95	4·00	4·20	4·03	3·53	3·68	3·49	2·99	3·17	2·91	2·58	1·19	6,239	3·81
2·74	3·14	3·49	3·28	3·90	3·85	3·61	4·14	3·97	3·41	3·23	2·97	2·75	3·00	2·87	2·24	1·88	5,840	3·64
2·56	3·19	3·45	3·53	3·90	3·75	4·00	4·05	4·05	3·61	3·41	3·30	2·86	2·90	2·86	2·16	1·90	5,814	3·63
·65	·61	·30	·25	·27	·50	·39	·50	·30	·20	·45	·52	·24	·27	·13	·42	1·24	425	·18
2·72	3·25	3·45	3·41	3·87	3·85	3·85	4·04	3·95	3·54	3·45	3·29	2·84	3·03	2·85	2·35	1·55	5,974	3·70
2·54	3·11	3·23	3·08	3·61	3·55	3·82	3·68	3·39	3·64	3·75	3·21	2·72	2·74	2·67	2·34	2·08	5,460	3·48
3·30	3·57	3·92	4·05	4·29	4·19	4·32	4·22	4·14	3·43	3·49	3·61	2·97	3·16	2·97	2·61	1·59	6,353	4·05
2·51	2·96	3·21	3·17	3·75	3·51	3·92	3·59	3·75	3·64	3·64	2·97	2·80	2·83	2·63	2·15	1·62	5,617	3·58
2·82	2·76	3·19	3·30	3·64	3·92	3·75	3·87	3·26	3·39	3·28	3·16	2·58	2·84	2·63	2·38	1·52	5,379	3·45
2·64	2·99	3·17	3·21	3·75	3·45	3·68	3·66	3·41	3·19	3·26	3·11	2·74	2·74	2·68	2·04	1·37	5,365	3·45
2·56	3·00	3·26	3·13	3·37	3·82	3·53	3·41	3·73	3·47	3·53	3·05	2·47	2·73	2·37	1·82	·96	5,212	3·42
·79	·81	·75	·97	·92	·74	·79	·81	·88	·45	·49	·64	·50	·43	·60	·79	1·12	1,141	·63
2·73	3·07	3·33	3·32	3·74	3·74	3·84	3·74	3·61	3·46	3·49	3·19	2·71	2·84	2·66	2·22	1·52	5,564	3·58
2·28	2·60	2·80	3·09	3·24	3·33	3·66	3·43	3·59	3·35	3·14	2·88	2·38	2·38	2·30	1·61	·91	5,003	3·32
2·32	2·88	3·03	3·13	3·41	3·35	3·26	3·43	3·49	3·45	2·97	2·80	2·36	2·58	2·27	1·66	·97	4,930	3·26
2·19	2·76	3·08	3·13	3·30	3·23	3·41	3·45	3·35	3·41	3·13	2·75	2·26	2·67	2·16	1·70	·77	4,861	3·23
2·12	2·79	2·94	3·01	3·49	3·35	3·14	3·03	3·23	3·05	2·97	3·01	2·46	2·44	2·13	1·69	·71	4,735	3·15
·20	·28	·28	·12	·25	·12	·52	·42	·36	·40	·17	·26	·20	·29	·17	·09	·26	268	·17
2·23	2·76	2·96	3·09	3·36	3·32	3·37	3·34	3·42	3·32	3·05	2·86	2·37	2·52	2·22	1·67	·84	4,882	3·24
2·50	2·75	3·16	3·23	3·37	3·70	3·85	3·59	3·68	3·11	3·14	2·59	2·33	2·70	2·45	2·27	1·74	5,070	3·44
2·35	2·86	3·21	2·94	3·45	3·16	3·55	3·23	3·49	3·33	3·19	2·86	2·56	2·84	2·65	2·13	1·20	4,853	3·32
2·31	2·78	3·21	3·08	3·21	3·49	3·45	3·43	3·39	3·35	3·14	3·01	2·52	2·79	2·49	2·10	1·70	4,750	3·26
2·41	2·83	3·17	3·08	3·70	3·33	3·59	3·64	3·30	3·26	3·16	2·97	2·52	2·58	2·64	2·16	1·52	4,893	3·37
2·47	2·91	3·13	2·96	3·33	3·28	3·37	3·61	3·01	3·17	3·06	3·05	2·51	2·74	2·06	2·01	1·63	4,594	3·18
2·40	2·88	3·06	3·01	3·53	3·31	3·51	3·49	3·53	3·11	3·11	2·91	2·45	2·86	2·44	2·14	1·60	4,835	3·35
2·21	2·64	3·00	3·13	3·61	3·70	3·21	3·53	3·61	3·28	3·37	3·17	2·73	2·63	2·17	1·78	1·28	4,826	3·35
·29	·27	·21	·29	·49	·54	·64	·41	·67	·24	·31	·58	·40	·28	·59	·49	·54	476	·26
2·38	2·81	3·13	3·06	3·46	3·42	3·50	3·50	3·43	3·23	3·17	2·94	2·52	2·73	2·41	2·08	1·52	4,832	3·32
2·56	2·83	3·39	3·06	3·03	4·14	3·77	3·64	3·80	3·45	3·00	2·78	2·54	2·33	2·51	2·13	1·36	4,893	3·43
2·61	2·97	2·96	3·37	3·33	3·47	3·80	3·61	3·68	3·00	3·06	2·73	2·39	2·51	2·33	2·31	1·19	4,828	3·42
·05	·14	·43	·31	·30	·33	·03	·03	·12	·45	·06	·05	·15	·18	·18	·18	·17	65	·01
2·59	2·90	3·18	3·22	3·18	3·81	3·79	3·63	3·74	3·23	3·03	2·76	2·47	2·42	2·42	2·22	1·28	4,860	3·43

Digitized by Google

MEAN VELOCITIES

Solání Embankment

[*Instrument*—1″

Serial No.	1 Date, 1876-77-78.	2 Depth. Above Datum. h	Variation.	Central. H	Solání Aqueduct Gauge.	Hyd. Mean. R	Surface-Breadth. b	3 Fall of Water-Surface. Upper 4 miles. F_1	1 mile below Site. F_2	Lower 4½ miles. F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Left Steps immersed. Top	q	m	Last
Series 159.	9-9-'76	7·68	−·04	8·86	7·50	7·71	162·8	4·85	1·35	3·95	215	..	0	S	14	W	1·59	2·29	2·47	2·54
	9-3-'78	·63	−·02	·81	·55	·67	·8	4·65	1·25	3·95	214	..	0	..	0	P	1·35	1·86	2·01	2·33
	7-3- „	·61	·00	·79	·50	·65	·8	4·62	1·28	3·90	213	S δ W	6	W	7	G	1·19	1·63	2·11	2·12
	8-3- „	·61	−·01	·79	·53	·65	·8	4·67	1·25	3·93	211	W	10	V	7	P	1·31	1·55	2·28	2·18
	11-3- „	·60	−·01	·78	·51	·64	·8	4·68	1·26	3·91	218	..	0	..	0	G	1·39	1·80	2·08	2·31
	2-3-'77	·60	·00	·78	·55	·64	·8	4·63	1·22	4·00	?	W	9	W	14	W	1·49	2·08	2·29	2·41
	12-9-'76	·59	−·08	·77	·60	·64	·8	5·64	1·16	4·05	210	..	0	NE	17	W	1·58	2·11	2·34	2·41
	8-9- „	·51	·00	·69	·45	·62	161·7	4·92	1·23	3·95	220	..	0	ENE	5	H	1·49	1·95	?	2·46
	27-2-'77	·46	·00	·64	·40	·58	·7	4·57	1·23	3·90	?	S δ W	7	W δ S	25	P	1·22	1·92	2·27	2·28
δ	Range,	·22	..	·22	·20	·13	1·2	1·07	·19	·15	?010	..	..	..	..	..	·40	·74	?·46	·42
v	Means of 9,	7·59	..	8·77	7·51	7·64	162·6	4·80	1·25	3·95	?214	WSW	3			..	1·40	1·91	?1·98	2·34
Series 160.	25-5-'78	7·20	+·09	8·38	7·03	7·36	161·7	4·53	1·34	3·63	218	..	0	V	7	G	·68	1·45	1·92	2·14
	22-2- „	·07	−·01	·25	·90	·26	·7	4·71	1·34	3·50	218	E δ S	4	S	7	P	?	1·17	1·67	2·03
	„ „	·07	−·01	·25	·90	·26	·7	„	„	„	213	S	7	W	6	G	?	1·25	1·57	1·83
	„ „	·10	+·06	·28	·96	·28	·7	4·68	1·31	3·56	208	W	6	W	15	P	?	1·23	1·85	2·08
	6-2- „	6·97	·00	·14	·87	·21	160·5	4·71	1·27	3·47	210	W	8	W δ S	14	G	1·21	1·67	1·83	2·12
	8-2- „	·93	−·02	·10	·81	·18	·5	4·65	1·29	3·41	214	N	7	N	4	G	1·32	1·66	2·10	2·02
δ	Range,	·27	..	·27	·22	·18	1·2	·18	·07	·22	010	..	..	..	..	..	?·64	·50	·53	·31
v	Means of 6,	7·06	..	8·23	6·91	7·26	161·3	4·67	1·32	3·52	214	W	4			..	?1·07	1·41	1·82	2·04
Series 161.	20-2-'78	6·85	−·02	8·02	6·70	7·11	159·3	4·63	1·32	3·40	213	S	9	WNW	8	G	1·05	1·46	1·81	1·93
	19-2- „	·84	+·01	·01	·70	·15	·3	4·64	1·31	3·40	217	..	0	S	4	G	1·13	1·53	1·94	2·07
	„ „	·84	−·01	·01	·70	·15	·3	„	„	„	219	S	4	..	0	P	1·12	1·53	1·76	2·07
	23-1- „	·83	+·01	·00	·75	·14	·3	4·70	1·25	3·45	?	E	4	S	5	G	1·21	1·54	1·72	1·91
	„ „	·84	+·02	·01	·75	·15	·3	4·69	1·26	„	?	S	5	E	4	P	1·07	1·55	1·82	1·97
	24-1- „	·84	−·03	·01	·75	·15	·3	4·69	1·26	3·45	?	E	4	SE	5	G	1·06	1·44	1·70	1·69
	„ „	·83	+ 01	·00	·75	·14	·3	4·70	1·25	„	?	SE	5	E δ S	5	P	1·04	1·44	1·72	1·84
	18-2- „	·83	.00	·00	·70	·14	·3	4·65	1·30	3·40	215	E δ S	10	E δ S	4	P	1·04	1·63	1·97	1·95
	22-1- „	·82	−·02	7·99	·75	·14	·3	4·71	1·24	3·45	?	S	8	E	5	G	1·09	1·49	1·75	1·70
	„ „	·82	+ 01	·99	·75	·14	·3	„	„	„	?	E	5	S	9	P	1·06	1·46	1·76	1·79
	14-2- „	·70	·00	·87	·60	·03	·3	4·68	1·27	2·90	219	S	8	S	18	P	·82	1·45	1·76	1·83
δ	Range,	·15	..	·15	·15	·12	·0	·08	·08	·55	?006	..	..	..	..	..	·32	·19	·27	·38
v	Means of 11,	6·82	..	7·99	6·72	7·12	159·3	4·68	1·27	3·39	?217	SSE	4			..	1·06	·50	1·79	1·89

Digitized by Google

AND CUBIC DISCHARGES. **TABLE XLIV.**

MAIN SITE.

tin Tube-Rods]

6																7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations].																CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
of centre.						Centre.	Right of centre.						Steps immersed.				
7/8	70	65	60	40	20		20	40	60	65	70	7/8	Last	*m*	*g*	Top	D	V
2·61	2·91	3·03	3·63	3·64	3·43	3·61	3·43	3·57	3·13	3·09	2·88	2·56	2·48	2·47	1·92	1·62	4,698	3·40
2·30	2·78	2·99	3·00	3·41	3·61	3·24	3·21	3·37	3·16	3·19	2·79	2·29	2·44	2·00	1·72	·70	4,418	3·21
2·29	2·82	2·94	2·88	3·33	3·14	3·35	3·33	3·31	3·11	2·99	2·93	2·58	2·37	2·10	1·58	?	4,373	3·19
2·27	2·94	3·11	3·06	3·08	3·24	3·61	3·66	3·26	3·14	3·28	2·88	2·44	2·45	1·96	1·61	?	4,436	3·23
2·44	2·76	3·17	3·30	3·23	3·61	3·31	3·43	3·51	3·19	2·97	2·94	2·10	2·24	2·10	1·48	?	4,452	3·25
2·25	2·82	3·16	2·94	3·28	3·33	3·45	3·30	3·53	3·17	3·09	2·79	2·40	2·51	2·14	1·80	·52	4,467	3·26
2·41	2·79	3·21	3·26	3·21	3·53	3·53	3·53	3·66	3·33	3·16	2·86	2·32	2·59	2·29	1 92	1·66	4,593	3·36
2·44	2·93	3·00	3·14	3·51	3·43	3·61	3·61	3·57	3·16	3·09	2·90	2·41	2·49	2·31	1·94	1·56	4,584	3·38
2·14	2·78	3·01	2·91	2·97	3·30	3·06	3·43	3·23	3·11	2·99	3·01	2·61	2·43	2·46	2·03	1·35	4,108	3·05
·47	·18	·27	·75	·67	·47	·55	·45	·43	·22	·31	·22	·51	·35	·51	·55	?1·14	590	·35
2·35	2·84	3·07	3·12	3·30	3·40	3·42	3·44	3·45	3·17	3·09	2·89	2·41	2·44	2·20	1·78	?1·24	4,459	3·26
2·14	2·69	3·01	2·80	3·47	3·16	3·14	3·49	3·41	3·21	3·00	2·86	2·44	2·08	1·97	1·84	1·48	4,162	3·19
2·07	2·49	2·90	2·84	3·39	3·66	3·35	3·23	3·28	3·21	3·00	2·69	2·44	2·14	1·78	1·51	·85	4,093	3·19
2·16	2·54	3·01	3·14	3·35	3·33	3·17	3·26	3·47	3·00	3·05	2·87	2·31	2·04	1·92	1·59	·83	4,086	3·18
2·11	2·54	2·86	2·96	3·45	3·37	3·24	3·31	3·51	3·30	2·94	2·63	2·31	2·48	1·98	1·52	·86	4,153	3·22
2·25	2·79	3·17	3·13	3·51	3·68	3·45	3·33	3·35	3·14	2·70	2·69	2·24	2·15	1·55	1·50	·70	4,154	3·28
2·12	2·75	3·01	3·09	3·51	3·73	3·47	3·19	3·19	2·94	2·86	2·65	2·08	2·55	1·84	1·49	·60	4,072	3·23
·18	·30	·31	·34	·16	·57	·33	·30	·32	·36	·35	·23	·36	·51	·43	·35	·88	91	·10
2·14	2·62	2·99	2·99	3·45	3·49	3·30	3·30	3·37	3·13	2·93	2·73	2·30	2·24	1·84	1·58	·87	4,120	3·22
1·92	2·41	2·78	2·91	3·26	3·03	3·28	3·16	3·17	2·88	2·88	2·63	2·33	2·33	2·21	1·71	1·42	3,834	3·07
2·13	2·59	3·03	3·00	3·37	3·23	3·11	3·24	3·37	3·00	2·80	2·78	2·14	2·14	2·05	1·80	1·51	3,909	3·14
2·05	2·74	2·87	2·91	3·41	3·31	3·24	3·57	3·30	3·01	2·96	2·74	2·19	2·21	2·01	1·69	1·38	3,958	3·18
2·05	2·42	2·86	3·16	3·09	3·01	3·33	3·33	3·30	3·13	2·73	2·73	2·11	1·99	1·83	1·72	1·47	3,868	3·11
1·87	2·55	2·83	2·76	3·00	3·39	3·43	3·21	3·30	2·96	2·65	2·83	2·18	2·11	2·01	1·76	1·31	3,862	3·10
1·80	2·61	2·97	3·08	3·30	3·21	3·43	3·19	3·21	3·08	2·91	2·56	2·16	2·04	1·92	1·66	1·40	3,980	3·16
1·79	2·54	2·83	3·03	3·33	3·19	3·30	3·19	3·35	3·11	2·83	2·43	2·13	2·06	1·89	1·73	1·34	3,917	3·14
2·08	2·61	2·82	2·83	3·31	3·30	3·05	3·53	3·14	3·06	2·80	2·69	2·14	2·23	2·11	1·78	1·42	3,811	3·06
1·90	2·52	2·75	3·03	3·23	3·30	3·13	3·33	3·17	3·13	3·03	2·84	2·36	2·14	1·96	1·69	1·38	3,881	3·08
1·83	2·45	2·79	2·83	3·16	3·30	3·26	3·19	3·24	3·01	2·97	2·60	2·22	2·01	1·79	1·71	1·36	3,825	3·08
2·01	2·52	2·82	2·80	3·21	3·06	3·30	3·49	3·47	2·96	2·65	2·49	2·15	2·20	1·89	1·53	1·27	3,803	3·11
·34	·33	·28	·40	·41	·38	·38	·41	·34	·25	·38	·41	·25	·32	·42	·27	·24	155	·11
1·95	2·54	2·76	2·94	3·24	3·21	3·28	3·31	3·27	3·03	2·75	2·67	2·19	2·12	1·97	1·71	1·39	3,868	3·11

N

Digitized by Google

MEAN VELOCITIES

Solání Embankment

[*Instrument*—1″

* Series 163, only 3 steps immersed. † Series 164, 165,

Serial No.	1	2						3				4				5				
	Date 1876-77-78.	Depth.						Fall of Water-Surface.				Wind.				Timekeeper's Initial.	Steps immersed.			
		Above Datum.	Variation.	Central.	Solání Aqueduct Gauge.	Hyd. Mean.	Surface-Breadth.	Upper 4 miles.	1 mile below Site.	Lower 4½ miles.	Local Slope.	From Direction.	From Velocity.	To Direction.	To Velocity.		Top	q	ss	Last
		h		H		R	b	F_1	F_2	F_3	S									
Series 162.	9-11-'76	6·52	+ ·02	7·70	6·55	6·90	159·3	5·01	1·14	3·25	275	..	0	..	0	W	1·29	1·92	2·05	2·63
	2-2-'78	·49	− ·01	·67	·40	·87	·3	4·94	1·26	2·95	217	S	9	S	9	G	·60	1·30	1·66	1·96
	8-11-'76	·37	− ·02	·55	·45	·77	·3	5·01	1·09	3·25	288	..	0	..	0	P	1·19	2·21	2·36	2·63
	24-10- „	·28	− ·01	·46	·35	·70	·3	5·25	1·10	3·15	170	..	0	ENE	7	P	?	2·40	2·38	2·73
	„ „	·26	− ·02	·44	·33	·68	·3	5·27	„	3·13	160	ENE	7	NE	4	W	?	2·29	2·61	2·99
	δ Range,	·26	..	·26	·22	·22	·0	·33	·17	·30	123	..	..	..	..	..	?·69	1·10	·95	·94
	v Means of 5,	6·38	..	7·56	6·42	6·78	159·3	5·10	1·14	3·15	221	SE δ E 2				..	?1·03	2·02	2·21	2·57
Series 163.	21-10-'76	5·66	− ·01	6·84	5·60	6·25	157·0	5·07	1·23	2·70	155	..	0	..	0	H	·73		1·60	1·75
	„ „	·62	− ·02	·80	·56	·22	·0	5·11	„	2·66	150	..	0	S	6	W	·63	*	1·67	1·82
	19-10- „	·55	·00	·73	·49	·16	·0	5·13	1·23	2·59	200	W	7	..	0	H	?		1·80	1·95
	„ „	·56	+ ·01	·74	·50	·17	·0	5·17	„	2·60	195	W	12	SW	4	W	?	s e e	1·80	1·80
	20-10- „	·55	− ·01	·73	·50	·16	·0	5·08	1·22	2·60	165	..	0	..	0	H	?		1·57	1·70
	„ „	·51	− ·01	·69	·46	·13	·0	5·12	„	2·56	160	..	0	..	0	W	?		1·59	1·87
	δ Range,	·15	..	·15	·14	·12	·0	·10	·01	·14	050	..	..	..	..	..	?·10	..	·23	·25
	v Means of 6,	5·58	..	6·76	5·52	6·18	157·0	5·11	1·23	2·62	171	WSW 2				..	?·68	..	1·67	1·82
164.	11-10-'77	5·24	+ ·75	6·42	?4·69	5·98	154·7	5·29	1·72	2·49	?	W	7	N	4	P	·60	s e e †	s e e †	1·58
Series 165.	10-10-'77	5·01	− ·05	6·19	4·92	5·78	154·7	4·42	1·26	2·32	?	E δ S	5	SW	7	G	1·01			1·43
	10-10-'76	4·97	+ ·02	·15	5·20	·75	·7	4·91	0·94	1·30	180	..	0	NW	6	W	·87	s e e †	s e e †	1·33
	„ „	5·00	+ ·03	·18	·20	·78	·7	4·88	0·97	„	170	NW	6	..	0	P	·83			1·65
	„ „	·00	·00	·18	·20	·78	·7	4·63	„	„	„	..	0	W	5	W	·94			1·58
	11-10- „	4·90	− ·03	·08	·30	·69	·7	4·63	0·77	1·20	140	..	0	E	14	P	·75			1·32
	„ „	·86	·00	·04	·30	·65	·7	4·67	0·73	„	155	..	0	..	0	W	·75			1·44
	δ Range,	·15	..	·15	·38	·13	·0	·49	·53	1·12	?040	..	..	..	..	..	·26	..	..	·33
	v Means of 6,	4·96	..	6·14	5·19	5·74	154·7	4·69	·94	1·47	?163	N δ E 1				..	·86	..	..	1·46
166.	10-10-'77	4·53	− ·07	5·71	4·50	5·44	152·3	4·70	1·20	1·90	?	WSW	9	WSW	6	G	++			·93
	9-10-'76	·46	− ·02	·64	·75	·39	·3	4·87	0·88	1·35	155	..	0	E	12	P	s e e	s e e	s e e	1·14
	11-10-'77	·26	·00	·44	·20	·21	·3	4·77	1·23	2·00	?	E	4	E	15	G				·85
	δ Range,	·27	..	·27	·55	·23	·0	·17	·35	·65	?	..	..	..	..	..	..	..	..	..	·29
	v Means of 3,	4·41	..	5·60	4·48	5·35	152·3	4·45	1·10	1·75	?	ESE 3				..	..	..	..	·97

Digitized by Google

AND CUBIC DISCHARGES.

TABLE XLV.

MAIN SITE.

tin Tube-Rods].

only 2 steps immersed. ‡ Series 166, only 1 step immersed.

6																	7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations].																	CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
of centre.						Centre.	Right of centre.						Steps immersed.					
74½	70	65	60	40	20		20	40	60	65	70	74½	Last	*m*	*q*	Top	D	V
2·74	3·16	3·39	3·35	3·33	3·41	3·39	3·28	3·68	3·01	3·33	2·88	2·55	2·63	2·30	1·96	1·19	4,015	3·36
1·89	2·63	2·83	2·97	3·33	3·45	3·19	3·16	3·45	2·73	2·94	2·59	2·10	2·19	2·03	1·63	1·01	3,750	3·15
2·84	3·28	3·39	3·45	3·68	3·70	3·51	3·49	3·66	3·30	2·99	3·01	2·62	2·41	2·06	2·11	1·13	4,092	3·49
3·13	3·51	3·39	3·31	3·16	3·33	3·64	3·64	3·61	3·51	2·99	2·88	2·14	3·17	2·12	1·49	·82	3,944	3·41
3·14	3·61	3·47	3·23	3·49	3·31	3·59	3·70	3·75	3·61	3·11	2·94	2·32	2·38	1·95	1·57	·79	4,062	3·52
1·25	·98	·64	·48	·52	·39	·45	·54	·30	·88	·39	·42	·52	·98	·35	·62	·40	342	·37
2·75	3·24	3·29	3·26	3·40	3·44	3·46	3·45	3·63	3·23	3·07	2·86	2·35	2·56	2·09	1·75	·99	3,973	3·39
2·02	2·50	2·94	3·03	3·57	3·30	3·53	2·96	3·16	2·67	2·29	2·11	1·68	1·49	1·30		·85	3,342	3·15
2·04	2·64	2·96	3·13	3·55	3·37	3·33	2·83	3·19	2·75	2·33	1·99	1·63	1·43	1·18	*	·77	3,286	3·12
2·01	2·64	2·75	2·60	3·11	3·17	3·33	3·21	3·41	2·65	2·29	2·26	1·89	1·65	1·55	see	·83	3,189	3·06
2·14	2·41	2·78	2·67	2·84	3·26	3·33	3·24	3·24	2·90	2·48	2·45	1·70	1·60	1·43		·82	3,127	2·99
1·99	2·49	2·83	2·94	3·03	3·59	3·43	3·23	3·19	2·54	2·26	2·20	1·60	1·32	1·57		·76	3,166	3·04
2·08	2·44	2·63	2·84	3·08	3·14	3·11	3·26	3·16	2·58	2·37	2·21	1·92	1·65	1·44		·78	3,055	2·95
·15	·23	·33	·53	·73	·45	·42	·43	·25	·36	·22	·46	·32	·33	·39	..	·09	287	·20
2·05	2·52	2·82	2·87	3·20	3·31	3·34	3·12	3·23	2·68	2·34	2·20	1·74	1·52	1·41	..	·80	3,194	3·05
1·68	1·96	2·30	2·14	2·61	2·82	2·87	3·31	2·99	2·94	2·61	2·55	2·01	1·90	see †	see †	1·49	2,715	2·73
1·61	2·11	2·34	2·17	2·50	2·91	2·65	2·86	2·75	2·63	2·38	2·14	1·53	1·47			·98	2,748	2·87
1·57	2·19	2·19	2·46	2·88	2·73	2·68	2·61	2·76	2·72	2·05	2·10	1·56	1·37	see †	see †	·97	2,492	2·62
1·70	2·14	2·36	2·63	2·63	2·63	2·73	2·42	2·88	2·52	2·08	2·11	1·52	1·53			·84	2,485	2·60
1·74	2·06	2·22	2·33	2·61	2·64	2·73	2·51	2·41	2·51	1·99	1·95	1·55	1·16			·87	2,358	4·60
1·49	1·92	2·04	2·26	2·63	2·56	2·52	2·46	2·73	1·92	1·75	1·85	1·28	1·15			·83	2,278	2·42
1·51	1·92	1·99	2·25	2·69	2·33	2·55	2·44	2·45	2·39	1·68	1·60	1·38	1·14			·89	2,228	2·38
·25	·27	·37	·46	·38	·58	·21	·44	·47	·80	·70	·54	·28	·39	..	..	·15	520	·49
1·60	2·06	2·19	2·35	2·66	2·63	2·64	2·55	2·66	2·45	1·99	1·96	1·47	1·30	..	..	·90	2,432	2·56
1·51	1·66	1·97	2·10	2·42	2·56	2·56	2·61	2·63	2·26	2·01	1·80	1·56	1·03	++	++	++	2,117	2·39
1·49	1·88	2·05	2·20	2·54	2·59	2·59	2·33	2·50	2·42	1·95	1·80	1·23	·96	see	see	see	2,010	2·40
1·42	1·89	2·17	2·04	2·19	2·59	2·48	2·50	2·65	2·19	2·05	1·71	1·40	·90				1,968	2·33
·09	·23	·20	·16	·35	·03	·11	·28	·15	·23	·10	·09	·33	·13	..	..	..	149	·07
1·47	1·81	2·06	2·11	2·38	2·58	2·54	2·48	2·59	2·29	2·00	1·77	1·40	·96	..	..	..	2,061	2·37

Digitized by Google

MEAN VELOCITIES

Solání Embankment

[*Instrument*—1″

N.B.—Series 167, 166:—Lowest Step slightly immersed on Right Bank throughout.

Serial No.	1 Date, 1876-77.	2 Depth. Above Datum. h	Variation.	Central. H	Solání Aqueduct Gauge.	Hyd. Mean. R	Surface-Breadth. b	3 Fall of Water-Surface. Upper 4 miles. F_1	1 mile below Site. F_2	Lower 4½ miles. F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Left 75	Left 73½
Series 167.	15-2-'77	4·09	−·12	5·27	4·35	5·06	152·3	4·24	0·91	1·15	?	SW	11	SW	21	W		1·19
	7-10-'76	·08	−·02	·26	·50	·05	·3	4·65	0·75	1·30	205	..	0	NE	5	P		1·32
	„ „	·07	·00	·25	·49	·05	·3	4·66	„	1·29	„	NE	5	E	21	W		1·35
	10-2-'77	·00	·00	·18	·07	·02	151·2	4·83	1·10	1·97	?	S b E	5	SW	8	W		1·23
	„ „	·00	·00	·18	·07	·02	·2	„	„	„	?	SW	8	SW	19	P		1·21
	14-2- „	3·98	·00	·16	·10	·00	·2	4·70	1·05	1·70	185	..	0	S	10	W		1·14
	„ „	·98	·00	·16	·10	·00	·2	„	„	„	„	S	10	SSW	12	P		1·19
	19-2- „	·99	−·02	·17	·35	·01	·2	4·59	0·81	2·15	?	E	4	SW	7	P		1·17
	„ „	·96	−·04	·14	·32	·98	·2	4·62	„	2·12	?	SW	7	S	7	W		1·40
	„ „	·92	−·04	·10	·28	·95	·2	4·66	„	2·08	?	S	7	W	11	P		1·22
	δ Range,	·17	..	·17	·43	·11	1·2	·59	·35	1·00	?	..	..	..	..	..	?	·26
	v Means of 10,	4·01	..	5·19	4·26	5·01	151·5	4·65	·91	1·74	?	SSW 5				..	?	1·24
168.	15-10-'77	3·98	−·23	5·16	4·50	5·00	151·2	4·45	·65	·60	?	ENE	9	E	17	G	?o	1·22
Series 169.	17-2-'77	3·79	−·03	4·97	4·00	4·87	150·0	4·39	0·96	0·90	?	SW	6	S	6	P		1·14
	„ „	·78	·00	·96	3·99	·86	·0	4·40	0·95	0·89	?	S	6	SW	19	W		1·10
	8-2- „	·75	·00	·93	·75	·83	·0	4·78	1·17	1·75	?	NE	8	S	15	P		1·33
	6-10-'76	·76	·00	·94	4·00	·84	·0	4·67	0·93	1·00	200	..	0	..	0	P		1·28
	„ „	·75	−·02	·93	·00	·83	·0	4·68	0·92	„	„	..	0	NNE	7	W		1·29
	„ „	·73	−·01	·91	·00	·81	·0	4·70	0·90	„	„	NNE	7	NE	5	P		1·20
	„ „	·72	−·02	·90	·00	·81	·0	4·66	0·89	„	„	NE	5	..	0	W		1·25
	5-10- „	·72	−·01	·90	3·40	·81	·0	4·71	1·49	0·40	200	..	0	..	0	W		1·27
	„ „	·71	−·01	·89	·40	·80	·0	4·72	1·48	„	„	..	0	NE	10	H		1·19
	„ „	·70	−·02	·88	·40	·79	·0	4·73	1·47	„	„	NE	10	ENE	18	W		1·30
	δ Range,	·09	..	·09	·60	·08	·0	·39	·60	1·35	?	..	..	..	..	..	?	·23
	v Means of 10,	3·74	..	4·92	3·79	4·83	150·0	4·64	1·12	·87	?200	E 3				..	?	1·24
170.	15-10-'77	3·64	−·06	4·82	4·25	4·73	150·0	3·79	·56	·35	?	SE b S	5	V	7	G	?o	·90
	25-9-'76	·63	−·06	·81	·10	·72	·0	4·40	·70	·60	165	..	0	..	0	H	?o	1·07
	δ Range,	·01	..	·01	·15	·01	·0	·61	·14	·25	?	..	..	..	..	..	?	·17
	v Means of 2,	3·64	..	4·82	4·18	4·73	150·0	4·10	·63	·48	?165	SE b S 1				..	?	·99

Digitized by Google

TABLE XLVI.

AND CUBIC DISCHARGES.

MAIN SITE.

tin Tube-Rods].

on Left Bank only in three top Sets of Series 167. Series 169, 170:—No Steps immersed.

6															7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations].															CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
of centre.						Centre.	Right of centre.									
72½	70	65	60	40	20		20	40	60	65	70	72½	73¾	75	Last step.	D	V
1·31	1·66	1·92	1·94	2·40	2·38	2·20	2·14	2·31	2·06	1·70	1·45	1·30	1·13	·	·40	1,757	2·15
1·42	1·61	1·64	1·82	2·31	2·33	2·05	2·10	2·34	1·78	1·62	1·44	1·36	1·18		?	1,686	2·06
1·35	1·78	1·56	1·83	2·26	2·27	2·13	2·03	2·27	2·03	1·59	1·46	1·26	1·12		?	1,681	2·06
1·47	1·60	1·95	1·92	2·36	2·25	2·30	2·35	2·23	2·28	1·74	1·58	1·52	1·30		·44	1,746	2·17
1·54	1·69	1·93	1·84	2·09	2·40	2·44	2·26	2·29	2·22	1·84	1·61	1·49	1·22		·43	1,739	2·16
1·37	1·76	1·88	1·97	2·42	2·34	2·24	2·31	2·35	2·14	1·98	1·73	1·59	1·24		?	1,759	2·20
1·30	1·59	1·85	1·75	2·64	2·33	2·15	2·20	2·29	2·27	1·75	1·68	1·37	1·23		?	1,753	2·19
1·42	1·57	1·96	1·99	2·30	2·27	2·15	2·14	2·38	2·28	1·79	1·61	1·53	1·24		·34	1,729	2·15
1·41	1·70	1·94	2·03	2·33	2·32	2·19	2·24	2·24	2·19	1·71	1·68	1·46	1·41		·45	1,711	2·14
1·40	1·66	1·89	2·16	2·33	2·42	1·95	2·39	2·27	2·08	1·76	1·76	1·42	1·42	Not observed.	?	1,665	2·10
·24	·21	·40	·41	·55	·17	·49	·36	·15	·50	·39	·32	·33	·30	..	?·11	94	·14
1·40	1·66	1·85	1·93	2·34	2·33	2·18	2·22	2·30	2·13	1·75	1·60	1·43	1·25	..	?·41	1,722	2·14
1·36	1·40	1·63	1·51	1·74	1·81	1·72	1·55	1·84	1·72	1·53	1·29	1·09	1·09	?o	?o	1,350	1·69
1·30	1·39	1·69	1·79	2·03	1·96	1·83	2·03	2·00	1·90	1·65	1·59	1·28	1·17			1,444	1·87
1·26	1·39	1·47	1·74	1·80	1·94	1·79	1·89	2·03	1·66	1·63	1·40	1·21	1·13			1,374	1·78
1·46	1·50	1·92	1·80	2·34	2·42	2·19	2·16	2·29	2·00	1·84	1·65	1·29	1·14			1,635	2·13
1·36	1·50	1·55	1·73	2·27	2·10	1·82	1·81	2·08	1·73	1·67	1·37	1·36	1·15			1,469	1·91
1·33	1·56	1·75	1·86	2·24	2·08	1·78	1·90	2·07	1·55	1·38	1·37	1·23	1·10			1,449	1·89
1·26	1·51	1·51	1·76	2·05	1·96	1·85	1·71	2·05	1·78	1·46	1·32	1·16	1·10			1,411	1·85
1·30	1·49	1·58	1·67	2·21	1·97	1·67	1·86	2·12	1·89	1·50	1·30	1·22	1·13			1,424	1·87
1·31	1·37	1·62	1·69	2·13	2·09	1·79	1·76	2·09	1·62	1·51	1·45	1·32	1·12			1,420	1·86
1·29	1·55	1·57	1·56	2·10	1·98	1·85	1·89	2·01	1·76	1·53	1·23	1·22	1·21			1,410	1·85
1·40	1·44	1·62	1·65	2·14	1·95	1·83	1·86	1·96	1·78	1·50	1·33	1·26	1·07			1,404	1·85
·20	·19	·45	·30	·54	·48	·52	·45	·33	·45	·46	·42	·20	·14	?	..	261	·35
1·33	1·47	1·63	1·73	2·13	2·05	1·84	1·89	2·07	1·77	1·57	1·40	1·26	1·13	?	..	1,444	1·89
1·06	1·10	1·32	1·15	1·62	1·55	1·50	1·40	1·57	1·52	1·16	1·06	·99	·92	?o		1,096	1·46
1·19	1·28	1·23	1·40	1·85	1·80	1·35	1·52	1·71	1·51	1·31	1·10	1·01	·94	?o		1,152	1·54
·13	·18	·09	·25	·23	·25	·15	·12	·14	·01	·15	·04	·02	·02	?		56	·08
1·13	1·19	1·28	1·28	1·74	1·68	1·48	1·46	1·64	1·52	1·24	1·08	1·00	·93	?		1,124	1·50

Zero in computing D. Not immersed. Not immersed.

Digitized by Google

MEAN VELOCITIES

Solâni Embankment

[*Instrument*—1″

Series 171 to 175—No

Serial No.	1 Date, 1876-77-78.	2 Depth. Above Datum. h	Variation.	Central. H	Solâni Aqueduct Gauge.	Hyd. Mean. R	Surface-Breadth. b	3 Fall of Water-Surface. Upper 4 miles. F_1	1 mile below Site. F_2	Lower 4½ miles. F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Left 75	Left 73½
171.	31-10-'77	3·67	+·01	4·85	4·60	4·76	150·0	3·66	·24	·10	038	S	4	S	17	G	?o	·60
	30-10- „	·61	+·08	·79	·54	·71	·0	3·62	·24	·04	?	S	9	SW	18	P	?o	·55
	„ „	·57	·00	·75	·50	·68	·0	3·66	·24	·00	?	E	10	S	9	G	?o	·52
	δ Range,	·10	..	·10	·10	·08	·0	·04	·00	·10	?	..	..	..	..	..	?	·08
	v Means of 3,	3·62	..	4·80	4·55	4·72	150·0	3·65	·24	·05	?038	S 9				..	?	·56
172.	26-10-'77	3·64	·00	4·82	?4·55	4·73	150·0	3·39	·26	·05	?	SE	10	..	0	P	?o	·38
	22-10- „	·51	−·05	·69	·55	·62	·0	3·42	·13	·05	?	NW	4	SW ẟ W	10	G	?o	·40
	δ Range,	·13	..	·13	?·00	·11	·0	·03	·13	·00	?	..	..	..	..	..	?	·02
	v Means of 2,	3·58	..	4·76	?4·55	4·68	150·0	3·41	·20	·05	?	SSW 3				..	?	·39
Series 173.	2-10-'78	3·49	−·01	3·93	4·25	3·88	150·0	4·34	·41	·10	093	..	0	E	11	R	?o	1·05
	8-10- „	·49	·00	·93	·25	·88	·0	4·24	·41	·10	090	..	0	SW	17	R	?o	1·07
	3-10- „	·47	−·02	·91	·25	·86	·0	4·31	·39	·10	088	E	6	E	9	P	?o	1·08
	4-10- „	·44	·00	·88	·20	·84	·0	4·34	·41	·05	083	E	8	E	12	R	?o	1·05
	7-10- „	·44	−·02	·88	·20	·84	·0	4·24	·41	·10	085	..	0	N	8	P	?o	1·06
	δ Range,	·05	..	·05	·05	·04	·0	·10	·02	·05	010	..	..	..	..	..	?	·03
	v Means of 5,	3·47	..	3·91	4·23	3·86	150·0	4·29	·41	·09	088	E ẟ S 3				..	?	1·06
174.	26-9-'76	3·04	−·27	4·22	3·70	4·20	150·0	4·59	·51	·60	125	..	0	..	0	W	?o	·97
Series 175.	4-10-'76	2·87	+·05	4·05	2·90	4·05	150·0	5·06	1·14	1·40	215	..	0	..	0	H	?o	1·06
	„ „	·90	+·01	·08	·90	·07	·0	5·03	1·17	„	„	..	0	..	0	W	?o	1·11
	„ „	·92	·00	·10	·90	·09	·0	5·01	1·19	„	„	..	0	..	0	H	?o	1·08
	„ „	·91	−·01	·09	·90	·08	·0	5·02	1·18	„	„	..	0	..	0	W	?o	1·09
	„ „	·90	−·02	·08	·90	·07	·0	5·03	1·17	„	„	NW	5	W	17	H	?o	1·00
	δ Range,	·05	..	·05	·00	·04	·0	·05	·05	·00	000	..	..	..	..	..	?	·11
	v Means of 5,	2·90	..	4·08	2·90	4·07	150·0	5·03	1·17	1·40	215	W ẟ N 2				..	?	1·07

Digitized by Google

TABLE XLVII.

AND CUBIC DISCHARGES.

MAIN SITE.

tin Tube-Rods].

steps immersed.

6														7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations.]														CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
of centre.						Centre.	Right of centre.								
72½	70	65	60	40	20		20	40	60	65	70	72½	73½	75	D	V
·67	·69	·77	·79	1·12	1·04	·91	·93	·99	·91	·70	·69	·64	·59	?o	704·9	·93
·60	·63	·76	·66	·89	·89	·80	·85	·87	·75	·71	·55	·57	·50	?o	600·7	·81
·54	·60	·70	·68	·99	·98	·81	·90	·92	·83	·62	·64	·55	·47	?o	624·2	·84
·13	·09	·07	·13	·23	·15	·11	·08	·12	·16	·09	·14	·09	·12	?	104·2	·12
·60	·64	·74	·71	1·00	·97	·84	·89	·93	·83	·68	·63	·59	·52	?	643·2	·86
·48	·51	·53	·55	·85	·74	·74	·70	·81	·65	·51	·50	·46	·45	?o	516·2	·69
·41	·48	·51	·49	·72	·67	·59	·68	·69	·60	·45	·36	·34	·31	?o	450·3	·62
·07	·03	·02	·06	·13	·07	·15	·02	·12	·05	·06	·14	·12	·14	?	65·9	·07
·45	·50	·52	·52	·79	·71	·67	·69	·75	·63	·48	·43	·40	·38	?	483·3	·66
1·19	1·20	1·42	1·36	1·51	1·40	1·35	1·47	1·45	1·43	1·38	1·24	1·19	1·02	?o	852·7	1·40
1·16	1·24	1·38	1·43	1·43	1·35	1·41	1·41	1·31	1·40	1·28	1·38	1·17	1·03	?o	828·7	1·36
1·15	1·27	1·35	1·40	1·46	1·46	1·30	1·46	1·40	1·37	1·32	1·25	1·04	·96	?o	794·4	1·31
1·06	1·32	1·29	1·40	1·44	1·45	1·38	1·29	1·40	1·37	1·25	1·24	1·15	1·09	?o	820·7	1·36
1·14	1·33	1·35	1·33	1·30	1·40	1·36	1·38	1·41	1·36	1·30	1·33	1·17	1·13	?o	806·1	1·34
·13	·13	·13	·10	·21	·11	·11	·18	·14	·07	·13	·14	·15	·17	?	538	·09
1·14	1·27	1·36	1·38	1·43	1·41	1·36	1·40	1·39	1·39	1·31	1·29	1·14	1·05	?	820·5	1·35
1·10	1·12	1·15	1·23	1·33	1·38	1·38	1·47	1·46	1·44	1·20	1·20	1·00	·91	?o	887·6	1·34
1·27	1·42	1·40	1·62	2·48	1·71	1·67	1·65	1·92	1·55	1·32	1·29	1·14	1·00	?o	1,155	1·82
1·19	1·44	1·52	1·45	2·09	1·94	1·70	1·80	2·02	1·56	1·30	1·18	1·10	1·11	?o	1,140	1·78
1·23	1·35	1·45	1·56	2·14	1·95	1·68	1·58	1·97	2·03	1·45	1·22	1·05	1·02	?o	1,156	1·80
1·26	1·27	1·45	1·49	1·97	1·90	1·66	1·68	1·97	1·87	1·48	1·23	1·11	1·01	?o	1,122	1·75
1·23	1·45	1·39	1·46	2·10	1·92	1·65	1·65	2·05	1·62	1·57	1·14	1·07	·96	?o	1,137	1·78
·08	·18	·13	·17	·51	·24	·05	·22	·13	·48	·27	·15	·09	·15	?	34	·07
1·24	1·39	1·44	1·52	2·16	1·88	1·67	1·67	1·99	1·73	1·42	1·21	1·09	1·02	?	1,142	1·79

Digitized by Google

MEAN VELOCITIES

Solání Embankment

[*Instruments—Nos.* 176 *to* 180. 1″ *tin Tube-Rods.*

Series 176 to 181—No

Serial No.	1 Date, 1876-77-78.	2 Depth. Above Datum. h	Variation.	Central. H	Solání Aqueduct Gauge.	Hyd. Mean. R	Surface-Breadth. b	3 Fall of Water-Surface. Upper 4 miles. F_1	1 mile below Site. F_2	Lower 4½ miles. F_3	Local Slope. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	Left 75	Left 73½
176.	26-9-'78	2·83	·00	3·27	3·30	3·28	150·0	5·00	·70	·30	?323	E	8	E	18	P	?o	1·30
	24-9- „	·82	·00	·26	·30	·27	·0	5·06	·69	·30	160	..	0	NW	5	R	?o	1·25
	δ Range,	·01	..	·01	·00	·01	·0	·06	·01	·00	?163	..	..	..	..	..	?	·05
	v Means of 2,	2·83	..	3·27	3·30	3·28	150·0	5·03	·70	·30	?242	E b N 6				..	?	1·28
177.	27-9-'76	2·49	−·04	3·67	2·65	3·70	150·0	4·94	1·01	1·35	200	..	0	E	10	H	?o	·92
	30-9- „	·47	+·04	·65	·50	·68	·0	5·06	1·14	1·10	?	NE	4	E	17	W	?o	·96
	29-9- „	·40	+·10	·58	·40	·61	·0	5·03	1·17	1·03	195	NE	4	NE	4	H	?o	·81
	28-9- „	·33	−·03	·51	·50	·55	·0	5·05	1·00	1·13	185	E	12	E	27	W	?o	·91
	δ Range,	·16	..	·16	·25	·15	·0	·12	·17	·32	?015	..	..	..	..	..	?	·15
	v Means of 4,	2·42	..	3·60	2·51	3·64	150·0	5·02	1·08	1·15	?193	E b N 9				..	?	·90
178.	16-10-'77	2·30	·00	3·48	3·20	3·53	150·0	4·63	·27	·10	?	..	0	SE	8	G	?o	·60
	„ „	·55	+·10	·73	·35	·75	·0	4·08	·37	·25	?	S b W	7	..	0	P	?o	·49
	δ Range,	·25	..	·25	·15	·22	·0	·55	·10	·15	?	..	..	..	..	..	?	·11
	v Means of 2,	2·43	..	3·61	3·28	3·64	150·0	4·36	·32	·18	?	SSE 4				..	?	·55
179.	2-10-'76	2·00	·00	3·18	2·05	3·25	150·0	5·18	1·12	·85	?	W	5	..	0	H	?o	·86
	„ „	1·99	−·02	·17	·05	·24	·0	5·19	1·11	„	?	..	0	E	10	W	?o	·85
	3-10- „	·85	·00	·03	·00	·11	·0	5·18	1·02	·90	180	..	0	..	0	H	?o	·81
	„ „	·84	−·02	·02	·00	·10	·0	5·19	1·01	„	„	..	0	NE	5	W	?o	·80
	δ Range,	·16	..	·16	·05	·10	·0	·01	·11	·05	?	..	..	..	..	..	?	·06
	v Means of 4,	1·92	..	3·10	2·03	3·18	150·0	5·19	1·07	·88	?180	ENE 1				..	?	·83
180.	19-9-'78	1·69	+·08	2·32	2·30	2·28	150·0	5·54	·56	·10	150	..	0	..	0	P	?o	·74
	18-9- „	·64	·00	2·27	·30	·24	·0	5·89	·21	·10	145	NW	l	..	0	R	?o	·63
	δ Range,	·05	..	·05	·00	·04	·0	·35	·35	·00	050	..	..	..	..	..	?	·11
	v Means of 2,	1·67	..	2·30	2·30	2·26	150·0	5·72	·39	·10	148	NW l				..	?	·69
181.	12-7-'78	·35	+·07	1·53	·93	1·69	150·0	7·58	·59	?·06	090	..	0	S	11	R	?o	·20

Digitized by Google

AND CUBIC DISCHARGES. **TABLE XLVIII.**

MAIN SITE.

No. 181. 1″ *wood Rods* (< 1′ *long*), *and* 1″ *tin Tube-Rods* (1′ *and* 1½′ *long*)].

steps immersed.

6															7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations].															CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
of centre.						Centre.	Right of centre.									
72½	70	65	60	40	20		20	40	60	65	70	72½	73¾	75	D	V
1·36	1·51	1·55	1·57	1·74	1·74	1·67	1·81	1·70	1·65	1·49	1·51	1·28	1·09	?o	842·7	1·65
1·27	1·52	1·52	1·59	1·68	1·72	1·61	1·74	1·81	1·61	1·60	1·33	1·22	1·04	?o	837·1	1·65
·09	·01	·03	·02	·06	·02	·06	·07	·11	·04	·11	·18	·06	·05	?	5·6	·00
1·32	1·52	1·54	1·58	1·71	1·73	1·64	1·78	1·76	1·63	1·55	1·42	1·25	1·07	?	839·9	1·65
1·01	1·22	1·25	1·28	1·73	1·68	1·41	1·47	1·69	1·39	1·20	1·11	·96	·82	?o	866·5	1·50
1·15	1·26	1·32	1·38	1·82	1·64	1·41	1·39	1·84	1·63	1·26	1·10	1·00	·93	?o	905·2	1·58
1·04	1·20	1·22	1·36	1·83	1·63	1·45	1·48	1·58	1·51	1·12	1·05	1·04	·92	?o	851·3	1·51
1·06	1·15	1·23	1·18	1·71	1·53	1·31	1·47	1·57	1·39	1·16	·99	·86	·87	?o	788·8	1·42
·14	·11	·10	·20	·12	·15	·14	·09	·27	·24	·14	·12	·18	·11	?	116·4	·16
1·07	1·21	1·26	1·30	1·77	1·62	1·40	1·45	1·67	1·48	1·19	1·06	·97	·89	?	852·9	1·50
·65	·66	·73	·75	·94	·88	·77	·89	1·02	·81	·67	·63	·60	·59	?o	470·2	·86
·51	·63	·68	·66	·85	·79	·72	·77	·83	·79	·63	·60	·53	·49	?o	445·3	·76
·14	·03	·05	·09	·09	·09	·05	·12	·19	·02	·04	·03	·07	·10	?	24·9	·10
·58	·65	·71	·71	·90	·84	·75	·83	·93	·80	65	·62	·57	·54	?	457·7	·81
·88	1·02	1·15	1·11	1·59	1·35	1·18	1·21	1·54	1·43	1·15	·93	·93	·79	?o	677·1	1·34
1·02	1·05	1·06	1·15	1·47	1·32	1·20	1·20	1·50	1·45	1·13	1·03	·81	·75	?o	659·5	1·31
·85	·95	·99	1·00	1·41	1·24	1·12	1·16	1·37	1·23	·93	·90	·79	·72	?o	583·7	1·21
·90	·96	1·00	1·05	1·43	1·31	1·11	1·18	1·38	1·11	·90	·90	·89	·72	?o	583·8	1·22
·17	·10	·16	·15	·18	·11	·09	·05	·17	·34	·25	·13	·14	·07	?	93·4	·13
·91	1·00	1·05	1·08	1·48	1·31	1·15	1·19	1·45	1·31	1·03	·94	·86	·75	?	626·0	1·27
·74	·92	·80	·76	·96	·81	1·01	·96	1·01	1·09	1·01	·85	·62	·51	?o	315·0	·90
·76	·85	·74	·87	·88	·85	·95	·91	·89	1·02	·96	·79	·52	·50	?o	286·7	·84
·02	·07	·06	·11	·08	·04	·06	·05	·12	·07	·05	·06	·10	·01	?	28·3	·06
·75	·89	·77	·82	·92	·83	·98	·94	·95	1·06	·99	·82	·57	·51	?	300·9	·87
·22	·21	·28	·25	·54	·43	·41	·49	·61	·29	·15	·13	·14	·16	?o	114·1	·44

Digitized by Google

MEAN VELOCITIES

[*Instruments*—1″

15TH MILE,

Serial No.	1	2										3					4				5
	Date, 1878. No. 191 in 1879.	DEPTH. Above Datum.	Variation.	Date of Soundings.	Central.	At Solani Aqueduct Gauge.	Hyd. Mean.	Surface-Breadth.	Wet Border.	Area.	FALL of Water-Surface. Upper 2 miles.	3 miles below Site.	Lower 4½ miles.	LOCAL SLOPE Left Bank.	Right Bank.	WIND. From Direction.	From Velocity.	To Direction.	To Velocity.	Timekeeper's Initial.
		h			H		R	*b*	B	A	F_1	F_2	F_3	S	S					
191	29-5	15·31	+·02	28-3	10·99	9·99	9·49	174·9	182·0	1726·8	2·28	3·63	5·54	240	?	NW	*l*	NE	3	R
Series 192.	24-4	14·35	−·01	28-3	10·03	9·00	8·67	174·9	180·0	1560·6	2·24	3·66	4·87	238	Not observed.	N	3	..	0	T
	23-4	·34	−·01	,,	·02	·00	·66	·9	·0	1558·9	2·25	3·65	4·87	228		..	0	..	0	R
	10-4	·33	−·01	,,	·01	·00	·65	·9	·0	1557·2	2·26	3·64	4·90	253		..	0	..	0	T
	29-4	·33	−·02	,,	·01	·00	·65	·9	·0	1557·2	2·26	3·64	4·87	223		..	0	..	0	R
	30-4	·30	−·02	,,	9·98	·00	·62	·9	179·9	1552·0	2·29	3·61	4·90	220		..	0	..	0	T
	1-5	·28	−·01	,,	·96	8·90	·61	·9	·9	1548·5	2·26	3·69	4·80	225		..	0	..	0	R
	δ Range,	·07	..	..	·07	·10	·06	·0	·1	12·1	·05	·08	·10	033	?	..	..	..	..	..
	v Means of 6	14·32	..	..	10·00	8·98	8·64	174·9	180·0	1555·7	2·26	3·65	4·87	231	?	N	*l*			..
193.	8-4	14·03	+·12	28-3	9·71	8·70	8·39	174·9	179·4	1505·2	2·26	3·64	4·75	228	?	..	0	..	0	R
	4-4	13·98	·00	,,	·66	·70	·35	·9	·3	1496·6	2·31	3·59	4·75	223	?	..	0	..	0	T
	29-3	·95	·00	,,	·63	·70	·32	·9	·2	1491·3	2·34	3·56	4·70	230	?	N	8	NW	7	R
	δ Range,	·08	..	..	·08	·00	·07	·0	·2	13·9	·08	·08	·05	007	?	..	..	..	..	..
	v Means of 3	13·99	..	..	9·67	8·70	8·35	174·9	179·3	1497·7	2·30	3·60	4·73	227	?	NNW	2			..
194	15-4	13·72	−·03	28-3	9·40	8·40	8·12	174·9	178·8	1451·5	2·27	3·63	4·55	228	?	SW	4	..	0	R
	16-4	·48	+·01	,,	·16	·10	7·91	·9	·3	1410·0	2·26	3·69	4·25	233	?	..	0	..	0	T
	δ Range,	·24	..	..	·24	·30	·21	·0	·5	41·5	·01	·06	·30	005	?	..	..	..	..	..
	v Means of 2	13·60	..	..	9·28	8·25	8·02	174·9	178·5	1430·8	2·27	3·66	4·40	231	?	SW	1			..
195	25-5	12·53	+·15	28-3	8·21	7·05	7·13	171·3	174·7	1245·2	2·06	3·79	3·65	?	?	..	0	N	4	T

15TH MILE,

	1	2									3					4				5
	Date.	*h*			H		R	*b*	B	A	F_1	F_2	F_3	S	S	D	V	D	V	
196.	18-12	15·20	−·03	16-12	9·76	9·83	8·71	186·0	191·8	1670·3	2·28	3·69	5·43	215	?	W	3	..	0	R
	19-12	·17	+·01	,,	·73	·85	·68	185·9	·7	1664·7	2·21	3·64	5·45	213	238	..	0	V	4	S
	20-12	·10	·00	,,	·66	·80	·63	·7	·4	1651·7	2·28	3·62	5·23	210	233	..	0	V	4	R
	δ Range,	·10	..	..	·10	·05	·08	·3	·4	18·6	·07	·07	·22	005	?005	..	..	..	..	..
	v Means of 3	15·16	..	..	9·72	9·83	8·67	185·9	191·6	1662·3	2·26	3·65	5·37	?221		W	1			..
197	1879 15-4	14·69	+·10	28-4	9·72	9·35	8·35	184·2	189·4	1581·5	2·19	3·66	5·20	215	225	V	4	SW	14	S

Digitized by Google

AND CUBIC DISCHARGES. TABLE XLIX.

tin Tube-Rods].

OLD SITE.

6																						7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations].																						CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
Left of centre.										Centre.	Right of centre.												
Edge	Side-slope 84	82½	80	75	70	65	60	40	20		20	40	60	65	70	75	Side-slope 80	82½	84	Edge		D	V
?o	2·42	2·90	3·45	3·61	3·87	4·22	4·29	4·05	4·55	4·55	4·29	4·29	4·22	3·95	3·85	3·33	3·00	2·83	2·38	?o		7,187	4·19
0 in computing D.	1·88	2·42	2·94	3·49	3·61	3·90	3·80	3·61	4·00	3·85	4·00	4·11	4·11	3·90	3·53	3·33	2·63	2·38	1·85	0 in computing D.		5,890	3·77
	2·14	2·54	2·88	3·53	3·90	4·17	4·32	3·80	4·20	4·55	4·48	4·48	4·61	4·17	3·90	3·66	2·86	2·66	2·08			6,492	4·16
	2·03	2·59	3·16	3·37	3·85	4·00	3·90	3·80	4·00	4·41	4·11	4·29	4·05	4·00	3·75	3·23	2·75	2·42	1·92			6,226	4·00
	2·08	2·58	2·91	3·49	3·85	3·90	4·20	3·90	4·05	4·35	4·08	4·11	4·05	3·95	3·85	3·57	2·65	2·78	1·85			6,223	4·00
	2·08	2·52	2·83	3·37	3·95	3·61	4·00	3·95	3·90	4·35	4·35	4·05	4·00	4·05	3·66	3·30	2·61	2·54	1·81			6,154	3·96
	2·08	2·65	3·00	3·41	3·82	4·00	4·11	4·17	3·66	4·00	4·55	4·35	4·17	4·00	3·47	3·39	2·78	2·48	1·70			6,209	4·01
?	·26	·23	·33	·16	·34	·56	·52	·56	·54	·70	·55	·43	·61	·27	·43	·43	·25	·40	·38	?		602	·39
?	2·05	2·55	2·95	3·44	3·83	3·93	4·06	3·87	3·97	4·25	4·26	4·23	4·17	4·01	3·69	3·41	2·71	2·54	1·87	?		6,199	3·98
?o	1·56	2·48	3·19	3·37	3·75	3·85	4·05	3·95	3·80	4·00	4·22	3·95	4·48	4·00	3·75	3·33	2·65	2·50	1·58	?o		5,851	3·89
?o	1·25	2·36	2·97	3·16	3·80	3·95	4·11	3·70	4·00	4·11	4·11	4·05	3·95	4·00	3·57	3·45	2·88	1·90	1·55	?o		5,771	3·86
?o	·90	2·27	2·78	3·41	3·57	3·80	3·95	3·85	3·75	4·05	4·05	4·00	4·11	4·00	3·61	3·33	2·54	2·34	1·90	?o		5,737	3·85
?	·66	·21	·41	·25	·23	·15	·16	·25	·25	·11	·17	·10	·53	·00	·18	·12	·34	·60	·35	?		114	·04
?	1·24	2·37	2·98	3·31	3·71	3·87	4·04	3·83	3·85	4·05	4·13	4·00	4·18	4·00	3·64	3·37	2·69	2·25	1·68	?		5,786	3·87
?o	1·63	2·46	2·59	3·30	4·11	3·85	3·75	4·00	4·00	4·17	4·48	4·00	4·05	3·75	3·37	3·37	3·53	2·00	2·54	?o		5,711	3·92
?o	·97	1·90	2·80	3·33	3·66	3·66	3·75	3·90	3·95	4·17	3·85	4·29	4·11	3·85	3·57	3·26	2·48	2·42	1·74	?o		5,532	3·93
?	·66	·56	·21	·03	·45	·19	·00	·10	·05	·00	·63	·29	·06	·10	·20	·11	·05	·42	·80	?		179	·01
?	1·30	2·18	2·73	3·32	3·89	3·76	3·75	3·95	3·98	4·17	4·17	4·15	4·08	3·80	3·47	3·32	3·01	2·21	2·14	?		5,622	3·93
?o	?	1·44	2·24	2·97	3·26	3·45	3·53	3·45	3·61	3·66	3·57	3·66	4·00	3·61	3·30	3·00	2·36	1·76	1·69	?		4,370	3·51

NEW SITE.

6																						7	8
Left of centre.										Centre.	Right of centre.												
Edge	Side-slope q	m	80	75	70	65	60	40	20		20	40	60	65	70	75	Side-slope 80	m.	q	Edge		D	V
?o	2·46	2·87	3·47	3·61	4·11	4·41	4·32	4·29	4·14	4·44	4·35	4·35	4·32	4·03	3·85	3·31	3·24	2·70	2·16	?o		6,921	4·14
?o	2·50	2·78	3·70	3·70	4·17	4·69	4·35	4·22	4·35	4·22	4·41	4·29	4·55	4·05	3·70	3·30	3·23	2·75	1·95	?o		6,844	4·11
?o	2·52	2·69	3·33	3·87	4·29	4·20	4·26	4·26	4·35	4·38	4·35	4·29	4·17	4·05	3·97	3·57	3·05	2·79	2·04	?o		6,806	4·12
?	·06	·18	·37	·26	·18	·49	·09	·07	·21	·22	·06	·06	·38	·02	·27	·27	·19	·09	·21	?		115	·03
?	2·49	2·78	3·50	3·73	4·19	4·43	4·31	4·26	4·28	4·35	4·37	4·31	4·35	4·04	3·84	3·39	3·17	2·75	2·05	?		6,857	4·12
?o	2·21	2·65	3·13	3·66	3·53	3·95	3·90	3·53	3·75	4·29	4·29	4·61	4·29	4·17	3·49	3·53	3·49	2·75	2·07	?o		6,287	3·98

Digitized by Google

MEAN VELOCITIES

BELRA

[*Instruments*—1″

Serial No.	1	2								3				4				5
	Date, 1879.	Depth.					Surface-Breadth.	Wet Border.	Area.	Fall of Water-Surface.		Local Slope.		Wind. From		To		Timekeeper's Initial.
		At Gauge.	Variation.	Date of Soundings.	Central.	Hyd. Mean.				Upper 1 mile.	Lower 4 miles.	Left Bank.	Right Bank.	Direction.	Velocity.	Direction.	Velocity.	
		h			H	R	*b*	B	A	F_1	F_2	S	S					
201.	27-3	7·54	−·07	26-3	9·89	9·19	188·5	197·0	1810·6	?·72	4·05	175	185	..	0	..	0	A
	9-1	·50	·00	8-1	·68	·03	·5	196·2	1772·5	?	?	195	205	..	0	..	0	A
	10-1	·44	−·02	„	·57	8·98	·4	·1	1761·2	?	?	185	200	S	6	..	0	P
	11-1	·44	+·03	„	·57	·98	·4	·1	1761·2	?	?	200	205	S	8	..	0	A
	17-3	·29	−·02	19-3	·48	·93	·3	·6	1756·5	·67	3·90	180	175	N	1	N	1	P
δ Range,		·25	..	..	·41	·26	·2	·9	54·1	?	?	025	030	..	..	..	..	...
v Means of 5,		7·44	..	..	9·63	9·02	188·4	196·4	1772·4	?·70	?3·98	191		S 1				..
Series 202.	18-3	7·20	·00	19-3	9·39	8·86	188·2	196·4	1739·5	·66	3·81	170	190	..	0	..	0	A
	17-1	·04	+·03	13-1	·23	·63	·0	195·6	1688·4	?	?	200	220	N	7	NW	3	A
	21-1	·03	·00	20-1	·69	·75	·0	·5	1711·8	?	?	205	205	..	0	..	0	P
	22-1	·01	+·02	„	·67	·74	·0	·5	1708·0	?	?	205	205	N	3	NW	4	A
	24-2	6·98	−·05	26-2	·21	·68	·0	·4	1697·0	·98	3·59	180	185	..	0	S	2	P
	23-1	·98	·00	„	·64	·71	·0	·4	1702·4	?	?	205	210	NW	11	NNW	5	A
	„	·94	·00	20-1	·60	·68	187·9	·3	1694·8	?	?	205	210	..	0	..	0	P
δ Range,		·26	..	..	·48	·23	·3	1·1	51·1	?	?	035	035	..	..	..	..	...
v Means of 7,		7·03	..	..	9·49	8·72	188·0	195·6	1706·0	?·82	?3·70	200		NNW 2				..
Series 203.	25-3	6·90	·00	26-3	9·25	8·64	187·9	195·5	1690·1	0·76	3·61	170	165	..	0	S	11	P
	20-3	·86	−·08	19-3	·05	·56	·9	·6	1675·6	0·60	3·67	190	185	..	0	..	0	P
	15-3	·83	+·14	12-3	·06	·41	·8	·6	1645·0	1·03	3·64	180	195	..	0	N	1	P
	16-1	·79	+·07	13-1	8·98	·42	·8	·1	1641·4	?	?	195	205	S	5	..	0	P
	25-2	·79	−·02	26-2	9·02	·52	·8	·0	1661·3	1·17	2·40	180	190	..	0	N	1	A
	14-3	·78	−·13	12-3	·01	·37	·8	·5	1635·6	0·58	3·39	175	?	..	0	..	1	A
	25-1	·76	·00	20-1	·42	·52	·8	194·9	1661·0	?	?	200	235	N	1	..	0	P
	25-2	·75	−·01	26-2	8·98	·48	·7	·9	1653·8	1·21	3·36	180	190	N	1	N	7	P
	27-1	·70	·00	29-1	9·02	·31	·7	195·3	1622·4	0·96	3·51	200	210	S	1	..	0	A
δ Range,		·20	..	..	·27	·33	·2	·7	67·7	?·63	?·31	030	?070	..	..	..	..	...
v Means of 9,		6·80	..	..	9·09	8·47	187·8	195·3	1654·0	?·90	?3·51	?191		S 1				..

Digitized by Google

AND CUBIC DISCHARGES. **TABLE L.**

SITE.

tin Tube-Rods.]

6															7	8	9
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations].															CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.	SILT in grains per cub. foot.
Left of centre.							Centre.	Right of centre.									
Edge	Side-slope m | 90	80	70	60	40	20		20	40	60	70	80	Side-slope 90 | m	Edge	D	V	
0 in computing D.	1·88	2·24	2·73	3·16	2·94	2·83	3·19	3·19	2·97	3·19	3·09	2·94	2·88	2·49	2·08	0 in computing D.	5,432	3·00	86
	2·06	2·48	3·23	3·39	3·26	3·33	3·28	3·19	3·59	3·23	3·49	3·33	3·03	2·48	1·89		5,751	3·24	71
	2·08	2·45	3·05	3·14	3·35	3·39	3·11	3·37	3·37	3·33	3·23	3·09	3·30	2·31	2·36		5,739	3·26	?
	2·11	2·51	3·03	3·37	3·23	3·41	3·19	3·39	3·51	3·31	3·11	3·37	3·06	2·37	2·16		5,765	3·27	93
	2·07	2·54	3·08	2·97	3·06	3·08	3·08	3·08	3·23	3·13	3·17	2·96	3·09	2·47	1·69		5,367	3·06	1025
?	·23	·30	·50	·42	·41	·58	·20	·31	·62	·20	·40	·43	·42	·18	·67	?	398	·27	?954
?	2·04	2·44	3·02	3·21	3·17	3·21	3·17	3·24	3·33	3·24	3·22	3·14	3·07	2·42	2·04	?	5,611	3·17	?319
0 in computing D.	1·90	2·36	2·73	3·03	3·19	3·21	3·24	3·09	3·13	3·19	2·91	3·09	3·03	1·87	2·08	0 in computing D.	5,324	3·06	73
	1·96	2·46	3·28	3·41	3·39	3·30	3·37	3·14	3·49	3·30	3·21	3·23	2·87	2·36	2·17		5,431	3·22	2981
	2·16	2·46	3·06	3·41	3·06	3·24	3·28	3·05	3·28	3·16	3·21	3·21	3·01	2·38	2·23		5,364	3·13	668
	2·03	2·29	2·79	3·23	3·24	3·14	3·19	3·11	3·43	3·31	3·05	3·19	2·73	2·30	2·21		5,309	3·11	63
	1·92	2·32	2·84	3·19	2·99	3·05	3·08	3·28	3·08	3·14	2·83	2·91	2·83	2·05	1·85		5,149	3·03	161
	2·14	2·28	3·06	2·91	3·26	3·31	3·21	3·43	3·30	3·23	3·13	3·06	2·82	2·55	2·11		5,425	3·19	129
	2·03	2·48	3·09	2·97	3·14	3·00	3·35	3·23	3·28	3·21	2·96	3·41	3·14	2·32	2·04		5,301	3·13	129
?	·26	·20	·55	·50	·40	·31	·29	·38	·41	·17	·38	·50	·41	·68	·38	?	282	·19	2918
?	2·02	2·38	2·98	3·16	3·18	3·18	3·25	3·19	3·28	3·22	3·04	3·16	2·92	2·26	2·10	?	5,329	3·12	600
Zero in computing D.	2·14	2·25	2·68	3·06	3·01	3·05	3·14	3·47	3·00	3·17	3·08	3·01	2·68	2·00	1·71	Zero in computing D.	5,193	3·07	81
	2·03	2·13	2·93	3·03	3·21	3·24	3·11	3·13	2·93	3·28	2·97	3·19	2·80	2·08	2·03		5,174	3·09	124
	1·91	2·23	2·90	2·93	3·08	3·03	3·14	3·37	3·24	3·39	2·99	2·93	2·93	2·15	1·94		5,109	3·11	90
	1·93	2·33	2·90	3·51	3·23	3·24	3·35	3·31	3·05	3·37	2·99	3·26	2·97	2·28	2·07		5,259	3·20	342
	1·80	2·34	2·76	2·83	3·19	3·21	3·30	3·05	3·53	3·19	3·06	3·09	2·99	2·27	2·13		5,083	3·06	1029
	1·83	2·33	2·90	2·93	3·09	2·88	2·93	2·83	3·23	3·05	3·14	3·09	2·58	2·03	1·88		4,753	2·91	986
	1·92	2·41	3·01	3·11	3·35	3·39	3·00	3·17	3·28	3·26	3·30	3·30	2·99	2·69	2·03		5,311	3·20	108
	1·96	2·26	2·90	2·94	2·94	3·05	3·16	3·19	3·01	3·05	2·86	3·21	2·91	2·04	1·91		4,984	3·01	1029
	2·04	2·25	2·93	3·11	3·31	3·30	3·23	3·19	3·43	3·41	3·45	3·11	2·61	1·90	2·03		5,142	3·17	138
?	·34	·28	·33	·68	·41	·51	·40	·64	·50	·36	·59	·37	·41	·79	·42	?	558	·29	948
?	1·95	2·28	2·88	3·05	3·16	3·15	3·15	3·19	3·17	3·24	3·09	3·13	2·83	2·16	1·97	?	5,112	3·09	436

Digitized by Google

MEAN VELOCITIES

BELRA

[*Instruments*—1″

Serial No.	Date, 1879.	1	2									3				4				5
			DEPTH.									FALL of Water-Surface.				WIND.				
			At Gauge.	Variation.	Date of Soundings.	Central.	Hyd. Mean.	Surface-Breadth.	Wet Border.	Area.	Upper 1 mile.	Lower ¼ miles.	LOCAL SLOPE.		From		To		Timekeeper's Initial.
													Left Bank.	Right Bank.	Direction.	Velocity.	Direction.	Velocity.	
			d			H	R	b	B	A	F_1	F_2	S	S					
Series 204.	13-3		6·67	+ ·26	12-3	8·90	8·27	187·7	195·3	1614·9	1·19	3·58	200	205	S	1	..	0	P
	21-3		·53	− ·02	19-3	·72	·28	·5	194·9	1613·7	0·73	3·34	175	185	..	0	..	0	P
	18-2		·53	− ·01	19-2	·72	·24	·5	·8	1605·0	0·63	3·11	185	205	N	1	..	0	P
	27-2		·51	− ·05	26-2	·74	·28	·5	·4	1608·8	0·75	3·22	195	180	..	0	..	0	A
	22-3		·51	− ·01	19-3	·70	·26	·5	·9	1609·9	0·75	3·32	180	195	..	0	..	0	A
	17-2		·50	+ ·04	19-2	·69	·21	·5	·8	1599·4	0·36	3·11	200	210	N	1	N	1	A
	27-2		·49	− ·03	26-2	·72	·26	·5	·3	1605·0	0·77	3·20	195	180	..	0	N	1	P
	20-2		·49	− ·01	19-2	·68	·20	·5	·8	1597·5	1·07	3·10	185	200	..	0	..	0	A
	24-3		·45	− ·01	26-3	·80	·25	·4	·5	1605·7	0·71	3·36	180	190	..	0	..	0	P
	28-1		·44	+ ·04	29-1	·76	·08	·4	·7	1573·6	1·02	3·25	210	220	..	0	..	0	P
	28-2		·43	− ·02	26-2	·66	·21	·4	·2	1593·8	0·53	3·24	180	330	..	0	N	1	A
	21-2		·42	·00	19-2	·61	·14	·4	·6	1584·4	0·84	3·03	175	205	..	0	N	1	P
	6-2		·41	·00	5-2	·67	·11	·4	·7	1579·4	0·75	3·32	200	205	..	0	N	1	A
	22-2		·41	·00	19-2	·60	·13	·4	·6	1582·5	0·95	3·02	185	195	..	0	..	0	A
	δ Range,		·26	..	..	·30	·20	·3	1·1	41·3	·83	·56	035	150	..	..	..	..	..
	v Means of 14,		6·49	..	..	8·71	8·21	187·5	194·7	1598·1	·79	3·28	198		N 1				..
Series 205.	7-2		6·37	− ·02	5-2	8·63	8·08	187·4	194·6	1571·9	0·79	3·28	190	215	..	0	N	1	P
	30-1		·33	·00	29-1	·65	7·99	·3	·5	1553·0	1·03	3·19	215	220	..	0	..	0	A
	8-2		·32	00	5-2	·58	8·03	·3	·5	1562·5	0·94	3·28	195	205	N	1	..	0	A
	4-2		·28	·00	„	·54	7·80	·3	·4	1555·0	0·68	3·19	195	220	..	0	..	0	P
	10-2		·27	·00	12-2	·51	·96	·3	·2	1546·4	0·84	2·88	195	205	..	0	..	0	P
	31-1		·21	·00	29-1	·53	·88	·2	·2	1530·6	0·95	3·12	205	235	NNW	7	NW	5	P
	δ Range,		·16	..	..	·14	·28	·2	·4	41·3	0·35	·40	025	030	..	..	..	..	..
	v Means of 6,		6·30	..	..	8·57	7·96	187·3	194·4	1553·2	0·87	3·15	208		NW ½ N 1				..
Series 206.	3-2		6·02	·00	5-2	8·28	7·77	187·0	193·8	1506·4	0·84	2·88	215	220	..	0	..	0	A
	7-3		5·94	− ·03	5-3	·23	·70	186·9	·6	1491·2	0·72	3·05	200	220	..	0	..	0	P
	8-3		·92	·00	„	·21	·69	·9	·5	1487·4	0·74	2·83	195	200	..	0	..	0	A
	6-3		·91	·00	„	·20	·68	·9	·5	1485·6	0·75	3·02	205	210	N	1	..	0	A
	11-2		·88	− ·05	12-2	·12	·62	·9	·3	1473·4	1·03	2·49	195	?200	..	0	..	0	P
	3-3		·86	+ ·02	5-3	·15	·63	·9	·4	1476·2	0·85	2·87	208	184	N	6	N	5	C
	13-2		·82	·00	12-2	·06	·57	·8	·2	1462·2	0·84	2·43	195	?190	..	0	N	1	A
	4-3		·82	·00	5-3	·11	·60	·8	·3	1468·8	0·74	2·93	205	210	V	1	N	1	P
	11-3		·75	− ·05	12-3	7·98	·47	·7	·2	1442·7	0·69	2·86	190	205	..	0	N	19	A
	14-2		·74	·00	12-2	·98	·50	·7	·0	1447·3	0·82	2·35	195	?195	..	0	..	0	A
	10-3		·74	− ·02	12-3	·97	·46	·7	·2	1440·8	0·72	2·85	185	190	..	0	..	0	P
	15-2		·72	·00	12-2	·96	·48	·7	192·9	1443·6	0·74	2·35	195	?190	E	5	..	0	P
	δ Range,		·30	..	..	·32	·31	·3	·9	65·6	·34	·70	030	?036	..	..	..	..	..
	v Means of 12,		5·84	..	..	8·10	7·60	186·8	193·3	1463·8	·79	2·74	?200		N ½ E 1				..

Digitized by Google

AND CUBIC DISCHARGES. TABLE LI.

SITE.

tin Tube-Rods].

6																7	8	9
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations].																CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.	SILT in grains per cub. foot.
Left of centre.								Centre.	Right of centre.									
Edge	Side-slope m	Side-slope 90	80	70	60	40	20		20	40	60	70	80	Side-slope 90	Side-slope m	Edge	D	V	
Assumed zero in computing Discharge.	1·91	2·15	2·86	2·90	2·94	3·03	3·23	3·11	3·24	3·21	3·11	3·14	2·99	1·87	2·13	Assumed zero in computing Discharge.	4,900	3·03	134
	1·83	2·22	2·76	2·76	2·93	3·23	3·17	3·08	3·19	3·03	2·80	3·05	2·84	1·82	1·99		4,815	2·98	55
	1·89	2·17	2·90	3·26	3·17	3·06	3·03	3·08	3·28	3·39	3·28	2·94	2·61	2·21	1·95		4,941	3·08	859
	1·84	2·10	2·86	2·76	2·83	3·01	3·21	3·14	3·30	3·05	3·08	2·97	2·47	2·19	2·14		4,762	2·96	144
	1·86	2·01	2·74	3·06	2·94	3·21	3·21	2·87	3·17	3·16	2·93	2·99	2·62	2·02	1·85		4,781	2·97	666
	1·97	2·48	3·16	2·83	3·33	2·90	3·05	2·83	3·19	2·99	3·09	3·05	3·00	1·85	1·83		4,718	2·95	98
	1·95	2·29	2·84	2·96	2·82	2·94	3·23	3·09	3·28	3·08	3·13	3·11	2·79	2·04	2·03		4,796	2·99	144
	1·82	2·12	2·75	2·61	3·16	2·94	3·37	3·09	3·08	3·37	3·16	2·83	2·55	2·06	1·83		4,777	2·99	105
	2·10	2·26	2·79	2·79	3·05	3·17	2·97	3·01	3·14	2·96	2·97	2·76	2·79	1·85	1·89		4,725	2·94	298
	1·96	2·33	2·93	2·97	2·80	3·43	3·08	3·30	3·28	3·23	3·28	2·96	2·83	2·05	1·97		4,934	3·14	1258
	1·94	2·19	2·93	3·05	2·99	3·06	3·13	3·11	3·09	3·11	2·97	3·03	2·75	1·81	1·70		4,786	3·00	84
	1·82	2·24	2·91	2·96	3·05	3·06	3·05	2·99	3·06	3·30	2·97	2·96	2·80	2·08	2·04		4,769	3·01	293
	1·94	2·12	3·09	2·86	3·41	3·01	3·09	3·01	3·16	3·14	3·37	2·83	3·17	2·18	1·79		4,801	3·04	60
	1·92	2·26	2·90	2·99	3·01	3·11	2·94	3·24	3·30	3·06	3·21	2·94	2·97	2·11	1·83		4,830	3·05	59
?	·28	·47	·42	·65	·61	·53	·43	·47	·24	·43	·57	·38	·70	·40	·44	?	223	·20	1203
?	1·91	2·21	2·89	2·91	3·03	3·08	3·13	3·07	3·20	3·15	3·10	2·97	2·80	2·01	1·93	?	4,810	3·01	304
0 in computing D.	1·92	2·17	2·97	3·03	2·99	3·11	3·16	2·97	3·45	3·30	3·26	2·97	2·80	1·97	1·83	0 in computing D.	4,791	3·05	241
	1·94	2·15	3·09	3·01	3·19	3·19	3·39	3·11	3·08	3·08	3·28	2·86	2·76	2·14	1·68		4,745	3·06	66
	1·89	2·32	2·96	2·97	3·08	3·11	3·55	3·17	3·09	3·24	3·00	3·37	2·67	2·19	1·92		4,826	3·09	96
	1·94	2·22	3·11	3·00	3·00	3·30	2·83	3·13	3·21	3·33	3·06	2·91	2·60	2·17	1·76		4,791	3·08	561
	1·66	2·29	3·08	3·09	3·37	3·16	3·24	2·99	3·14	3·26	2·97	3·17	2·52	1·86	1·78		4,724	3·05	108
	1·96	2·29	2·69	3·21	3·19	3·19	3·01	3·23	3·30	3·16	3·06	3·11	2·74	2·09	2·00		4,718	3·08	139
?	·30	·17	·42	·24	·38	·19	·72	·26	·37	·25	·31	·51	·28	·33	·32	?	108	·04	495
?	1·89	2·24	2·98	3·05	3·14	3·18	3·20	3·10	·321	3·23	3·11	·307	2·68	2·07	1·83	?	4,766	3·07	202
Zero in computing D.	1·82	2·09	3·06	3·03	3·03	3·11	3·08	3·01	3·11	3·33	3·16	2·86	2·78	1·99	1·96	Zero in computing D.	4,582	3·04	99
	1·72	2·08	2·52	2·96	3·01	3·08	2·91	2·67	3·28	3·03	3·19	2·80	2·74	2·01	1·69		4,284	2·87	138
	1·79	2·07	2·54	3·17	2·93	3·08	3·09	2·82	3·06	3·00	2·88	2·83	2·64	1·91	1·53		4,288	2·88	5233
	1·73	2·24	2·91	2·99	2·97	2·88	2·82	3·08	2·91	3·00	2·86	3·09	2·54	1·95	1·63		4,330	2·91	58
	1·76	2·07	2·84	2·79	3·13	3·09	2·97	3·19	3·19	3·17	3·06	2·87	2·54	1·64	1·52		4,415	3·00	818
	1·95	2·34	2·56	2·83	2·80	2·86	2·78	2·86	3·03	2·83	2·78	2·65	2·78	2·24	1·85		4,121	2·79	81
	1·72	2·26	2·83	2·80	2·94	3·17	3·28	3·17	3·09	3·30	3·09	3·17	2·72	1·92	1·67		4,481	3·06	99
	1·85	2·05	2·84	2·69	2·88	3·01	2·96	3·31	3·08	3·05	2·79	3·06	2·61	1·93	1·62		4,361	2·97	127
	1·67	1·92	2·59	2·80	2·96	3·01	2·88	2·97	2·97	3·08	2·96	2·86	2·56	2·11	1·67		4,166	2·89	48
	1·61	2·10	2·78	2·88	2·75	3·08	3·11	3·05	2·91	2·97	3·09	3·13	2·61	1·85	1·60		4,248	2·94	171
	1·64	2·24	2·62	2·73	2·72	3·03	2·61	2·79	3·05	2·97	2·88	2·90	2·72	1·64	1·68		4,064	2·82	123
	1·70	2·03	2·55	2·86	2·90	3·06	3·13	3·00	3·00	3·00	2·83	2·82	2·47	1·92	1·64		4,160	2·88	219
?	·34	·42	·54	·48	·41	·31	·67	·64	·37	·50	·41	·52	·31	·60	·44	?	518	·27	5185
?	1·75	2·12	2·72	2·88	2·92	3·04	2·97	2·99	3·06	3·06	2·96	2·92	2·64	1·93	1·67	?	4,292	2·92	601

Digitized by Google

MEAN VELOCITIES

JAOLÍ

[*Instruments*—1″

Serial No.	Date, 1879.	2 Depth. At Gauge. *h*	Variation.	Date of Soundings.	Central. H	Hyd. Mean. R	Surface-Breadth. *b*	Wet Border. B	Area. A	3 Fall of Water-Surface. Upper ½ mile. F_1	Lower 5 miles. F_2	Local Slope. Left Bank. S	Right Bank. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.
Series 211.	27-3	7·32	−·12	26-3	8·61	7·97	192·9	200·6	1599·6	·55	5·57	165	165	..	0	..	0	S
	7-1	·28	−·02	4-1	·67	·86	·8	·4	1574 0	·36	?	173	183	W	3	V	*l*	R
	„	·28	−·05	„	·67	·86	·8	4	1574·0	„	?	173	183	V	*g*	..	0	S
	9-1	·28	+·01	„	·67	86	·8	·4	1574·0	·36	5·58	178	?	V	*l*	V	*l*	S
	8-1	·25	·00	„	·64	·83	·8	·3	1568 2	·35	?	183	183	N	4	V	*l*	R
	10-1	·16	·00	„	·55	·75	·7	·1	1550·8	·38	5·46	175	183	N	6	NE	7	R
	11-1	·14	+·02	„	·53	·73	·7	·1	1546·9	·40	5·44	180	173	E	4	V	*l*	S
	6-1	·10	·00	„	·49	·70	·7	·0	1539·3	·39	?	180	180	S	5	W	3	S
	17-3	·07	−·04	19-3	·42	·82	·6	·0	1564·4	·32	5·42	150	153	NW	10	W	20	R
	∂ Range,	·25	..	..	·25	·27	·3	·6	60·3	·23	?·16	033	?030	..	..	..	..	..
	v Means of 9,	7·21	..	..	8·58	7·82	192·8	200·2	1565·7	·39	?5·49	?174		NW *b* W 2				..
Series 212.	18-3	6·86	−·04	19-3	8·21	7·64	192·4	199·5	1524·0	·33	5·21	148	155	W	*l*	SW	9	R
	21-1	·76	−·04	20-1	·19	·46	·3	·4	1488·3	·33	5·11	165	175	..	0	S	4	S
	24-2	·74	−·08	26-2	·12	·51	·3	·1	1494·6	·33	5·19	150	145	..	0	S	13	S
	22-1	·68	−·02	20-1	·11	·39	·2	·2	1472·9	·31	5·13	170	173	NW	7	W	17	R
	23-1	·64	·00	20-1	·07	·36	·2	·1	1465·2	·33	5·09	165	178	NW	4	W	25	S
	25-2	·60	·00	26-2	7·98	·38	·2	198·8	1467·7	·27	5·10	143	148	..	0	N	8	R
	∂ Range,	·26	..	..	·23	·28	·2	·7	58·8	·06	·12	027	033	..	..	..	..	..
	v Means of 8,	6·71	..	..	8·11	7·46	192·3	199·2	1485·4	·32	5·14	160		W *b* S 5				..
Series 213.	25-2	6·57	−·02	26-2	7·85	7·36	192·1	198·7	1461·9	·30	5·12	143	148	N	6	NW	6	S
	17-1	·54	−·02	13-1	·63	·19	·1	·8	1429·1	·35	4·99	158	?	W	11	W	14	R
	25-3	·53	+·02	26-3	·82	·28	·1	·8	1447 6	·31	5·08	150	158	E	17	E	17	S
	15-3	·50	+·20	12-3	8·01	·40	·1	·9	1471·8	·29	4·95	140	143	SW	5	W	3	R
	16-1	·35	−·04	13-1	7·44	·02	191·9	·4	1392·6	·32	5·00	163	168	..	0	V	*l*	S
	18-2	·33	·00	19-2	·68	·17	·9	·3	1421·4	·26	4·28	143	130	N	4	N	8	S
	17-2	·31	+·02	„	·66	·15	·9	·3	1417·6	·23	4·16	140	143	N	6	W	4	R
	∂ Range,	·26	..	..	·57	·38	·2	·6	79·2	·12	·96	025	?038	..	..	..	..	..
	v Means of 7,	6·45	..	..	7·73	7·22	192·0	198·6	1434·6	·29	4·80	?148		N *b* W 2				..
Series 214.	20-3	6·29	−·06	19-3	7·64	7·14	191·8	198·2	1414·5	·28	4·94	145	160	W	8	W	11	S
	25-1	·26	·00	20-1	·69	·02	·8	·3	1392·2	·33	4·76	140	155	W	6	W	12	R
	27-2	·23	−·04	26-2	·61	·06	·8	·0	1396·6	·24	4·28	135	148	W	10	NW	13	S
	„	·23	·00	„	·61	·06	·8	·0	1396·6	„	„	135	148	W	10	NW	20	R
	20-2	·20	·00	19-2	·55	·05	·8	·0	1396·5	·29	4·85	133	125	NW	16	W	7	R
	28-2	·19	−·04	26-2	·57	·02	·7	197·9	1389·0	·25	4·84	143	143	NW	10	W	33	R
	27-1	·17	−·04	29-1	·60	6·98	·7	198·0	1381·3	·32	4·82	150	158	E	6	E	5	S
	13-3	·11	+·32	12-3	·62	7·06	·7	·0	1397·0	·28	4·86	163	155	..	0	N	11	B
	∂ Range,	·18	..	..	·14	·16	·1	·4	33·2	·09	·66	030	035	..	..	..	..	..
	v Means of 8,	6·21	..	..	7·61	7·05	191·8	198·0	1395·5	·28	4·70	146		WNW 9				..

Digitized by Google

AND CUBIC DISCHARGES. **TABLE LII.**

SITE.

tin Tube-Rods].

6																					7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations.]																					CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
Left of centre.										Centre.	Right of centre.											
Edge	Side-slope m | $92\frac{1}{2}$	$87\frac{1}{2}$	$82\frac{1}{2}$	75	$67\frac{1}{2}$	60	40	20		20	40	60	$67\frac{1}{2}$	75	$82\frac{1}{2}$	$87\frac{1}{2}$	Side-slope $92\frac{1}{2}$ | m	Edge		D	V
Zero in computing D.	1·94	2·22	2·36	2·73	3·09	3·26	3·19	3·00	3·19	3·30	2·78	2·94	2·94	3·00	2·83	2·38	2·17	1·85	1·85	Zero in computing D.	4,754	2·97
	2·17	2·19	2·45	2·74	3·03	3·08	3·14	3·06	2·97	3·03	3·19	2·91	3·03	2·94	3·03	2·70	2·29	1·94	1·87		4,634	2·93
	2·07	2·29	2·52	2·59	2·99	3·23	3·06	2·96	3·01	3·06	3·09	3·09	3·06	3·06	2·97	2·52	2·36	2·05	1·99		4,671	2·97
	2·00	2·27	2·63	2·75	3·26	3·13	3·09	3·19	3·09	3·09	3·05	3·23	3·17	2·86	3·13	2·70	2·41	1·99	1·90		4,813	3·06
	1·83	2·29	2·51	2·82	3·17	2·88	3·06	3·21	3·14	2·96	2·91	3·03	3·06	2·88	3·09	2·65	2·43	2·03	1·81		4,660	2·97
	2·04	2·04	2·25	2·78	3·01	3·24	3·19	3·13	2·94	3·05	3·19	3·09	2·99	3·01	2·97	2·65	2·40	2·20	2·05		4,643	2·99
	1·96	2·30	2·34	2·58	3·16	3·06	3·06	3·06	3·13	3·13	2·91	2·94	3·06	2·88	3·11	2·80	2·31	2·19	1·88		4,590	2·97
	2·05	2·17	2·38	2·78	3·03	3·09	3·06	2·94	3·16	2·80	3·13	3·00	2·75	2·88	3·00	2·42	2·21	2·00	1·97		4,416	2·87
	2·00	2·08	2·27	2·78	2·73	2·94	2·86	3·00	3·16	3·06	3·00	2·94	2·86	2·91	2·70	2·36	2·16	2·04	1·65		4,493	2·87
?	·34	·26	·38	·24	·53	·38	·33	·27	·25	·50	·41	·32	·42	·20	·43	·44	·27	·35	·40	?	397	·19
?	2·01	2·21	2·41	2·73	3·05	3·10	3·08	3·06	3·09	3·05	3·03	3·02	2·99	2·94	2·98	2·58	2·30	2·03	1·89	?	4,631	2·96
Θ in computing D.	1·92	2·10	2·31	2·48	2·94	3·23	3·00	2·97	3·13	2·86	3·09	3·13	3·00	3·00	2·31	2·26	2·10	1·92	1·86	Θ in computing D.	4,384	2·88
	1·95	2·19	2·40	2·75	2·99	3·26	3·17	3·26	3·26	3·09	2·96	3·14	2·88	2·94	2·88	2·50	2·14	1·88	1·62		4,478	3·01
	1·96	2·13	2·29	2·70	2·70	2·80	3·03	2·94	2·75	3·09	3·13	3·26	3·09	2·59	2·54	2·24	2·13	1·84	1·62		4,330	2·90
	2·17	2·33	2·49	2·93	2·88	3·08	2·93	3·30	3·09	3·37	3·19	3·03	2·88	2·96	2·87	2·43	2·21	1·95	1·88		4,488	3·05
	1·82	2·19	2·60	2·78	3·00	2·75	3·25	3·13	3·19	3·00	2·91	3·09	2·86	3·00	2·93	2·48	2·14	1·91	1·80		4,328	2·95
	1·79	2·03	2·17	2·63	2·75	2·94	2·91	3·16	2·94	2·88	2·80	2·91	2·63	2·78	2·56	2·40	2·22	1·88	1·62		4,135	2·82
?	·38	·30	·43	·45	·30	·51	·32	·36	·51	·51	·39	·35	·46	·41	·62	·26	·12	·11	·26	?	353	·23
?	1·94	2·16	2·38	2·71	2·86	3·01	3·05	3·13	3·06	3·05	3·01	3·09	2·89	2·88	2·68	2·39	2·16	1·90	1·74	?	4,357	2·94
Zero in computing D.	1·96	2·24	2·46	2·61	3·03	2·59	3·06	2·91	3·03	2·94	2·91	3·19	2·94	2·70	2·68	2·44	2·08	1·80	1·74	Zero in computing D.	4,199	2·87
	1·99	2·03	2·33	2·74	2·86	2·99	2·93	2·93	2·84	3·28	3·16	3·08	2·73	2·82	2·84	2·44	2·15	2·06	1·79		4,201	2·94
	1·90	1·89	2·27	2·68	2·91	2·91	2·88	3·37	3·13	3·09	3·19	2·86	2·83	2·68	2·50	2·42	2·05	1·90	1·55		4,209	2·91
	1·85	2·21	2·13	2·63	2·61	2·83	2·83	3·00	2·88	3·00	2·94	3·09	2·63	2·56	2·63	2·42	1·89	1·71	1·71		4,146	2·82
	1·99	2·10	2·59	2·63	2·97	3·09	3·08	3·30	3·03	2·93	3·13	2·94	2·73	2·63	2·74	2·27	2·21	1·83	1·84		4,057	2·98
	1·76	2·04	2·08	2·44	2·80	2·91	2·91	3·13	2·86	3·09	2·88	2·86	2·68	2·61	2·50	2·13	1·92	1·85	1·71		4,002	2·82
	1·73	2·01	2·40	2·48	2·61	2·65	2·94	2·86	2·97	2·97	3·09	3·03	2·70	2·54	2·48	2·10	1·83	1·66	1·41		3,923	2·77
?	·26	·35	·51	·30	·42	·50	·25	·51	·29	·35	·31	·33	·31	·28	·36	·34	·38	·40	·43	?	286	·21
?	1·88	2·07	2·32	2·60	2·83	2·85	2·95	3·07	2·96	3·04	3·04	3·01	2·75	2·65	2·62	2·32	2·02	1·83	1·68	?	4,105	2·87
Zero in computing D.	1·86	1·88	2·31	2·70	2·91	2·86	2·91	2·91	2·68	2·94	3·09	3·09	2·75	2·88	2·29	2·13	1·95	1·76	1·62	Zero in computing D.	3,983	2·82
	1·90	1·96	2·31	2·65	2·99	3·16	3·05	2·97	3·05	2·75	3·08	3·26	3·06	2·68	2·80	2·38	2·10	1·82	1·73		4,024	2·89
	1·71	2·07	2·19	2·38	2·83	2·97	3·03	3·00	2·80	3·09	2·86	2·83	2·91	2·56	2·48	2·05	1·86	1·72	1·57		3,920	2·81
	1·74	1·94	2·07	2·46	2·91	2·88	2·88	3·00	2·88	3·03	2·94	2·88	2·78	2·56	2·50	2·17	1·90	1·73	1·60		3,905	2·79
	1·73	1·91	2·54	2·68	2·61	2·78	2·70	3·13	3·00	2·65	2·94	3·03	2·68	2·63	2·34	2·19	1·82	1·69	1·53		3,844	2·74
	2·08	2·01	2·38	2·73	2·78	2·83	2·73	2·88	3·00	2·91	2·70	3·03	2·80	2·38	2·50	2·07	1·85	1·70	1·47		3,840	2·77
	1·82	1·98	2·34	2·84	2·86	3·14	2·83	3·30	3·03	3·03	2·78	2·88	2·59	2·61	2·56	2·22	2·05	1·78	1·64		3,970	2·87
	1·81	1·84	2·36	2·59	2·61	2·86	3·03	2·97	2·97	3·09	3·03	3·00	2·65	2·48	2·46	2·16	1·96	1·81	1·69		3,943	2·82
?	·37	·23	·47	·46	·38	·38	·35	·42	·37	·44	·39	·43	·47	·50	·51	·33	·28	·13	·26	?	184	·15
?	1·83	1·95	2·31	2·63	2·81	2·94	2·90	3·02	2·93	2·94	2·93	3·00	2·78	2·60	2·49	2·17	1·94	1·75	1·61	?	3,929	2·81

Digitized by Google

MEAN VELOCITIES

JAOLÍ

[*Instruments*—1″

Serial No.	Date, 1879.	1	2								3				4				5
			Depth.								Fall of Water-Surface.				Wind.				
			At Gauge.	Variation.	Date of Soundings.	Central.	Hyd. Mean.	Surface-Breadth.	Wet Border.	Area.	Upper ½ miles.	Lower 5 miles.	Local Slope.		From		To		Timekeeper's Initial.
													Left Bank.	Right Bank.	Direction.	Velocity.	Direction.	Velocity.	
			h			H	R	b	B	A	F_1	F_2	S	S					
Series 215.	24-3		6·09	+·04	26-3	7·38	6·89	191·6	197·8	1363·1	·25	4·89	148	148	W	20	W	29	S
	21-3		·05	−·06	19-3	·40	·92	·6	·7	1368·5	·27	4·70	143	145	W	8	W	14	S
	21-2		·03	·06	19-2	·38	·90	·6	·6	1363·9	·31	4·68	138	133	..	0	N	5	S
	22-2		·01	·00	„	·36	·88	·6	·6	1360·1	·28	4·66	130	128	..	0	NW	1	R
	22-3		·01	+·02	19-3	·36	·89	·6	·6	1360·8	·23	4·76	148	148	SW	8	SW	17	R
	15-1		5.96	+·08	13-1	·05	·67	·5	·5	1317·9	·18	4·61	158	175	S	7	V	7	R
	28-1		·93	−·04	29-1	·26	·76	·5	·4	1335·3	·24	4·58	150	140	..	0	SW	6	S
	14-1		·88	+·05	13-1	6·97	·60	·4	·3	1302·6	·26	4·63	153	170	W	8	W	10	R
	8-2		·85	·00	5-2	7·20	·76	·4	·2	1332·4	·29	3·80	160	140	SW	10	W	11	R
	10-2		·84	−·04	12-2	·30	·62	·4	·1	1303·7	·23	3·99	135	135	..	0	N	3	S
	δ Range,		·25	..	..	·43	·32	·2	·7	65·9	·23	1·09	028	047	..	..	..	..	..
	v Means of 10,		5·97	..	..	7·27	6·79	191·5	197·5	1340·8	·25	4·53	145		W ½S 7				..
Series 216.	15-1		5·74	+·06	13-1	6·83	6·48	191·3	197·0	1275·8	·40	4·39	168	175	N	3	..	0	S
	30-1		·74	·00	29-1	7·07	·59	·3	·0	1298·9	·25	4·49	135	148	..	0	W	6	R
	6-2		·74	·00	5-2	·09	·66	·3	·0	1311·4	·25	3·84	143	143	W	14	W	20	R
	7-2		·65	·00	„	·00	·57	·2	196·8	1294·2	·24	3·75	140	143	W	9	NW	10	S
	4-2		·62	·00	„	6·97	·55	·2	·7	1288·5	·27	3·87	135	138	N	3	S	4	S
	31-1		·60	·00	29-1	·93	·47	·2	·7	1272·1	·29	4·35	158	135	W	20	W	25	S
	7-3		·59	+·02	5-3	·99	·51	·1	·7	1281·2	·20	4·39	143	143	..	0	NNW	5	S
	8-3		·55	+·10	„	·95	·48	·1	·6	1273·5	·24	4·35	135	143	..	0	SW	8	R
	6-3		·52	·00	„	·92	·45	·1	·6	1267·8	·27	4·32	138	138	NW	11	W	10	R
	δ Range		·22	..	..	·26	·21	·2	·4	43·6	·20	·74	033	040	..	..	..	..	..
	v Means of 9,		5·64	..	..	6·97	6·53	191·2	196·8	1284·8	·27	4·19	144		W ½N 7				..
Series 217.	3-2		5·42	·00	5-2	6·77	6·37	191·0	196·3	1250·2	·22	3·67	133	138	SW	11	SW	13	R
	4-3		·41	+·04	5-3	·81	·35	·0	·3	1246·8	·18	4·26	138	155	SW	6	W	25	R
	14-2		·39	·00	12-2	·85	·36	190·9	·1	1247·7	·20	3·54	133	138	..	0	N	3	R
	11-2		·37	−·06	„	·83	·34	·9	·1	1243·9	·22	3·52	135	150	E	4	SE	4	R
	13-2		·34	−·04	„	·80	·32	·9	·0	1238·1	·23	3·49	143	135	W	14	W	25	S
	11-3		·21	·00	12-3	·72	·20	·8	·0	1214·6	·23	4·06	138	138	E	11	SE	7	R
	δ Range,		·21	..	..	·13	·17	·2	·3	35·6	·05	·77	010	020	..	..	..	..	..
	v Means of 6,		5·36	..	..	6·80	6·32	190·9	196·1	1240·2	·21	3·76	140		WSW 6				..

Digitized by Google

AND CUBIC DISCHARGES. TABLE LIII.

SITE.

tin Tube-Rods.

6																					7	8
MEAN VELOCITIES past each vertical. (Each Velocity is the mean of three observations)																					CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
Left of centre.										Centre.	Right of centre											
Edge	Side-slope m | 92½	87½	82½	75	67½	60	40	20			20	40	60	67½	75	82½	87½	Side-slope 92½ | m	Edge		D	V
Zero in computing D.	1·73	1·95	2·34	2·65	3·00	2·86	3·00	2·94	3·03	3·13	3·16	3·00	2·91	2·70	2·61	2·16	1·96	1·71	1·53	Zero in computing D.	3,923	2·88
	1·69	1·66	2·16	2·68	2·78	2·73	2·91	2·63	3·03	2·86	2·91	2·86	2·70	2·83	2·48	2·19	1·86	1·63	1·55		3,701	2·70
	1·80	1·88	2·10	2·63	2·63	2·70	2·94	2·88	3·23	2·91	3·03	3·00	2·52	2·68	2·33	2·14	1·94	1·80	1·57		3,766	2·76
	1·86	1·92	2·29	2·61	2·63	3·00	2·91	2·94	3·09	2·86	2·86	2·94	2·78	2·46	2·36	2·13	1·96	1·74	1·64		3,758	2·76
	1·78	1·89	2·08	2·44	2·78	2·80	3·03	3·19	2·91	3·03	2·97	3·03	2·70	2·70	2·31	2·17	2·04	1·64	1·53		3,878	2·85
	1·80	1·90	2·21	2·55	2·86	3·03	3·08	2·97	2·99	3·00	3·09	3·03	2·93	2·74	2·65	2·40	2·13	1·80	1·60		3,787	2·95
	1·71	1·94	2·24	2·50	2·88	3·03	3·13	2·72	2·94	2·83	2·86	2·94	2·68	2·44	2·48	2·04	1·88	1·76	1·60		3,646	2·73
	1·84	2·06	2·21	2·59	2·82	3·13	3·19	3·01	2·90	3·08	3·01	2·97	2·94	2·56	2·68	2·44	2·26	1·79	1·68		3,757	2·89
	1·58	1·75	2·01	2·63	2·78	2·68	2·86	2·88	2·82	2·78	3·01	2·86	2·67	2·53	2·56	2·03	1·90	1·58	1·49		3,565	2·68
	1·82	1·82	2·19	2·46	2·61	2·70	3·03	3·03	3·03	2·78	2·80	2·83	2·61	2·38	2·38	2·05	2·01	1·75	1·69		3,617	2·77
?	·28	·40	·33	·24	·39	·45	·33	·56	·41	·35	·36	·20	·42	·45	·37	·41	·40	·22	·20	?	358	·27
?	1·76	1·88	2·18	2·57	2·78	2·87	3·01	2·92	3·00	2·93	2·97	2·95	2·74	2·60	2·48	2·18	1·99	1·72	1·59	?	3,740	2·80
Zero in computing D.	1·72	2·05	2·39	2·70	2·83	3·06	3·13	3·00	2·80	3·00	2·94	2·97	2·75	2·56	2·48	2·44	2·08	1·73	1·48	Zero in computing D.	3,625	2·84
	1·68	1·87	2·15	2·39	2·75	2·86	2·91	3·03	3·03	3·13	3·06	3·00	2·79	2·65	2·36	2·10	1·80	1·67	1·41		3,687	2·84
	1·79	1·97	2·33	2·31	2·44	2·80	2·86	2·97	3·00	3·03	2·91	3·00	2·65	2·42	2·21	1·94	1·88	1·57	1·39		3,584	2·73
	1·80	2·08	2·16	2·59	2·65	2·78	2·91	2·52	3·13	2·83	2·85	2·68	2·56	2·33	2·04	1·97	1·75	1·88	1·67		3,325	2·57
	1·64	1·84	2·11	2·36	2·54	2·70	2·65	2·94	2·75	2·80	3·00	2·86	2·61	2·31	2·19	1·85	1·73	1·58	1·35		3,372	2·62
	1·87	2·08	2·24	2·54	2·46	2·82	2·68	2·74	2·88	2·88	2·78	3·00	2·70	2·38	2·31	1·97	1·79	1·74	1·40		3,416	2·69
	1·67	1·78	2·17	2·59	2·83	2·75	3·03	2·88	2·75	2·94	2·75	2·88	2·63	2·42	2·33	2·00	1·85	1·64	1·43		3,491	2·72
	1·54	1·92	2·24	2·29	2·46	2·88	2·88	2·73	2·75	2·68	3·13	2·91	2·65	2·48	2·27	1·86	1·83	1·67	1·41		3,366	2·64
	1·60	1·75	2·07	2·44	2·59	2·73	2·80	2·70	2·73	2·91	2·94	2·91	2·63	2·44	2·27	2·29	1·91	1·69	1·42		3,394	2·68
?	·33	·33	·32	·41	·49	·36	·48	·51	·40	·45	·38	·32	·23	·34	·44	·59	·35	·31	·32	?	362	·27
?	1·70	1·93	2·21	2·47	2·59	2·82	2·87	2·83	2·87	2·91	2·93	2·91	2·66	2·44	2·27	2·05	1·85	1·69	1·44	?	3,473	2·70
0 in computing D.	1·60	1·71	1·95	2·21	2·39	2·83	2·65	2·61	2·63	2·97	2·86	2·91	2·46	2·44	2·27	1·85	1·58	1·64	1·36	0 in computing D.	3,246	2·60
	1·86	1·94	2·11	2·46	2·42	2·78	2·63	2·86	3·00	2·78	2·80	2·80	2·65	2·31	2·21	2·10	1·82	1·66	1·48		3,292	2·64
	1·55	1·77	2·08	2·50	2·56	2·61	2·68	2·86	2·91	2·83	2·80	2·97	2·42	2·31	2·04	1·85	1·67	1·46	1·39		3,294	2·64
	1·62	1·83	2·00	2·31	2·50	2·65	2·97	2·91	2·94	2·75	3·06	2·91	2·48	2·17	2·08	1·83	1·79	1·49	1·32		3,290	2·64
	1·82	1·72	2·05	2·40	2·34	2·44	2·80	3·03	2·91	2·73	2·88	2·83	2·33	2·24	2·05	1·90	1·51	1·69	1·41		3,233	2·61
	1·59	1·75	2·05	2·38	2·42	2·83	2·65	2·97	2·83	2·94	2·56	2·63	2·38	2·24	2·16	1·78	1·61	1·42	1·63		3,202	2·64
?	·31	·23	·16	·29	·22	·39	·34	·42	·37	·24	·50	·34	·32	·27	·23	·32	·31	·27	·31	?	92	·04
?	1·67	1·79	2·04	2·38	2·44	2·69	2·74	2·87	2·87	2·84	2·83	2·84	2·45	2·29	2·14	1·89	1·66	1·56	1·43	?	3,259	2·63

Digitized by Google

MEAN VELOCITIES

KAMBERRA

[*Instruments*—1″

Serial No.	1	2								3				4				5
		DEPTH.					Surface-Breadth.	Wet Border.	Area.	FALL of Water-Surface.		LOCAL SLOPE.		WIND.				
	Date, 1879.	At Gauge.	Variation.	Date of Soundings.	Central.	Hyd. Mean.				Upper 2½ miles.	Lower 8½ miles.	Left Bank.	Right Bank.	From		To		Tidekeeper's Initial.
		d			H	R	b	B	A	F_1	F_2	S	S	Direction.	Velocity.	Direction.	Velocity.	
221.	6-2	6·56	+·03	5-2	5·66	4·91	65·6	69·8	342·3	2·82	11·89	294	286	NNW	18	NNW	18	cl
	7-2	·51	·00	„	·61	·87	·5	·6	339·0	2·85	11·84	299	294	N	13	N	8	c
	4-2	·44	−·02	„	·54	·82	·4	·4	334·5	2·79	11·78	303	291	..	0	V	4	c
	3-2	·34	−·02	„	·44	·74	·5	·2	327·9	2·87	11·68	306	289	NNW	12	NW	7	cl
δ Range,		·22	..	..	·22	·17	·2	·6	14·4	·08	·21	012	008	..	..	..	..	..
v Means of 4,		6·46	..	..	5·56	4·84	65·5	69·5	336·0	2·83	11·80	295		NNW	9			..
Series 222.	20-3	6·21	−·01	19-3	5·74	4·76	66·3	69·9	332·9	2·82	11·69	274	260	N	11	N	11	cl
	31-1	·20	+·01	29-1	·28	·62	65·4	·1	318·8	2·93	11·65	296	277	NNW	10	N	23	c
	30-1	·15	·00	„	·23	·58	·3	68·9	315·5	2·98	11·61	301	277	..	0	NW	9	cl
	27-1	·14	·00	„	·22	·57	·3	·9	314·9	2·89	11·58	291	272	V	1	..	0	cl
	28-1	·12	·00	„	·20	·55	·3	·8	313·6	3·01	11·58	301	294	..	0	V	1	c
	25-1	·11	·00	20-1	·36	·54	·4	·8	312·4	2·92	11·54	291	276	NNW	9	NNW	10	c
	4-1	·03	·00	1-1	·27	·47	·0	·4	305·8	3·00	11·49	308	286	..	0	..	0	c
	„	·02	·00	„	·26	·46	·0	·4	305·2	3·02	11·48	308	286	..	0	V	1	c
	3-1	·02	·00	„	·26	·46	·0	·4	305·2	3·01	11·48	313	291	NNW	7	NNW	11	cl
	15-1	·00	·00	13-1	·24	·42	·0	·4	301·8	3·03	11·56	311	282	..	0	..	0	cl
	„	·01	+·02	„	·25	·42	·1	·4	302·4	3·12	11·57	311	282	..	0	V	1	c
	17-1	·01	−·02	„	·13	·42	·1	·4	302·4	2·97	11·47	301	262	N	10	N	18	cl
	„	·00	·00	„	·11	·42	·0	·4	301·8	2·98	11·46	301	262	N	19	N	21	c
	9-1	5·99	−·02	1-1	·23	·44	64·9	·3	303·2	2·94	11·50	308	289	..	0	..	0	cl
	10-1	·98	−·01	1-1	·22	·43	·9	·3	302·6	2·95	11·48	316	299	V	1	V	1	c
δ Range,		·23	..	..	·63	·34	1·4	1·6	31·1	·30	·23	042	039	..	..	..	..	..
v Means of 15,		6·07	..	..	5·27	4·50	65·2	68·7	309·2	2·97	11·54	291		N b W	6			..
Series 223.	14-1	5·93	−·01	13-1	5·17	4·36	64·9	68·2	297·2	3·00	11·49	303	287	N	13	N	13	cl
	„	·92	·00	„	·16	·35	·9	·1	296·6	2·99	11·48	303	287	NW	10	NW	6	c
	21-3	·89	·00	19-3	·42	·52	65·5	·9	311·8	2·99	11·45	296	279	N	13	N	13	c
	22-3	·88	·00	„	·41	·52	·5	·9	311·2	2·60	11·38	296	272	NW	12	NW	11	cl
	8-2	·80	·00	5-2	4·90	·33	64·3	67·7	293·0	2·78	11·36	311	306	V	1	N	7	cl
	25-3	·75	−·01	26-3	5·13	·40	·8	68·3	300·4	2·63	10·71	291	279	E	9	E	9	cl
	27-2	·73	−·01	26-2	4·94	·34	·6	·1	295·3	2·90	11·07	306	301	NW	8	NW	11	c
	„	·72	·00	„	·93	·33	·6	·1	294·7	2·91	11·06	306	301	NW	8	NW	11	cl
	28-2	·72	·00	„	·93	·33	·6	·1	294·7	2·81	10·98	294	308	NW	10	NW	11	c
	18-1	·71	·00	13-1	·82	·19	·4	67·5	283·0	2·96	11·27	318	306	N	15	N	16	cl
	24-3	·69	+·02	26-3	5·07	·35	·8	68·1	296·5	2·64	11·35	294	282	NW	11	NW	10	c
δ Range,		·24	..	..	·60	·33	1·2	1·4	28·8	·40	·78	027	036	..	..	..	..	..
v Means of 11,		5·79	..	..	5·08	4·37	64·8	68·2	297·7	2·84	11·24	297		NNW	9			..

Digitized by Google

AND CUBIC DISCHARGES. **TABLE LIV.**

SITE.

tin Tube-Rods.]

6																			7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations.]																			CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
Left of centre.									Centre.	Right of centre.										
Edge	Side-slope m	Side-slope 27½	25	22½	20	15	10	5		5	10	15	20	22½	25	Side-slope 27½	Side-slope m	Edge	D	V
?o	1·97	2·65	2·79	2·78	3·00	3·30	2·91	2·61	3·08	2·78	3·19	3·03	3·09	3·30	2·70	2·15	1·96	?o	981·6	2·87
?o	1·97	2·29	2·75	2·94	2·94	3·00	3·13	3·03	3·33	2·65	2·97	2·88	3·11	2·97	2·68	2·56	1·92	?o	967·0	2·85
?o	1·85	2·32	2·70	2·97	3·03	2·91	2·63	2·97	2·90	2·91	2·97	3·21	2·97	2·86	2·70	2·42	1·85	?o	948·0	2·83
?o	2·00	2·63	2·73	3·16	2·82	3·05	3·03	2·91	3·05	3·00	3·13	2·90	3·06	2·80	2·86	2·44	2·00	?o	945·8	2·88
?	·15	·36	·09	·38	·21	·39	·50	·42	·43	·35	·22	·33	·14	·50	·18	·41	·15	?	35·8	·05
?	1·95	2·47	2·74	2·96	2·95	3·07	2·93	2·88	3·09	2·84	3·07	3·01	3·06	2·98	2·74	2·39	1·93	?	960·6	2·86
Assumed zero in computing Discharge.	1·60	2·29	2·50	2·61	2·56	2·74	2·83	2·88	2·78	2·96	2·90	2·97	2·64	2·97	2·65	2·22	1·58	Assumed zero in computing Discharge	908·6	2·72
	1·95	2·52	2·88	2·83	2·63	2·86	3·03	2·91	3·29	2·88	3·21	3·17	2·94	2·94	2·91	2·48	2·03		921·4	2·89
	1·50	2·26	2·44	2·99	2·87	2·97	2·91	3·08	2·99	2·94	3·13	3·05	3·03	2·88	2·78	2·38	1·82		899·6	2·85
	1·74	2·17	2·70	3·00	2·96	3·00	2·82	3·01	2·88	3·05	2·96	3·06	2·88	2·83	2·52	2·41	2·10		896·6	2·85
	1·92	2·40	2·65	2·90	2·73	2·86	2·86	2·68	2·86	2·82	2·97	2·97	3·16	3·06	2·76	2·62	2·11		877·0	2·80
	1·82	2·52	2·78	2·67	2·75	2·80	2·94	2·84	2·96	2·78	3·01	2·91	3·19	3·00	2·93	2·44	2·08		879·8	2·82
	2·08	2·34	2·67	2·87	2·97	2·86	2·88	3·16	2·83	3·00	2·83	2·83	3·03	2·97	2·49	2·43	1·92		863·7	2·82
	1·93	2·20	2·65	2·93	2·94	3·17	3·01	2·75	3·03	2·99	2·82	2·96	2·82	2·80	2·65	2·37	1·89		862·7	2·83
	1·90	2·21	2·63	3·16	3·09	2·86	3·17	3·23	3·13	3·21	3·21	2·97	3·17	3·09	2·78	2·13	1·75		898·7	2·94
	1·56	2·44	2·70	2·88	2·78	2·86	2·94	2·78	2·99	2·70	2·83	3·00	3·16	2·74	2·61	2·46	1·71		834·8	2·77
	1·70	2·38	2·65	2·80	2·83	3·03	2·80	2·86	2·97	2·80	2·97	2·91	3·00	2·88	2·62	2·50	1·82		845·0	2·79
	1·79	2·27	2·93	2·80	2·65	2·80	2·84	2·97	2·83	3·19	3·17	3·05	2·80	2·80	2·72	2·45	2·16		862·6	2·85
	1·74	2·46	2·91	2·78	2·80	2·67	2·87	3·03	2·78	3·19	2·94	3·03	2·91	2·83	2·75	2·50	2·26		859·2	2·85
	1·68	2·29	2·64	2·76	2·70	2·88	2·55	2·91	2·88	2·69	3·06	3·09	3·05	2·70	2·65	2·46	1·85		830·5	2·74
	1·62	2·14	2·86	2·80	3·00	2·70	2·70	2·78	2·86	2·86	2·75	3·05	2·91	2·73	2·45	2·39	1·84		824·6	2·73
?	·58	·38	·49	·55	·53	·50	·62	·55	·51	·52	·46	·34	·53	·39	·48	·49	·68	?	96·8	·22
?	1·77	2·33	2·71	2·85	2·82	2·87	2·88	2·92	2·94	2·94	2·98	3·00	2·98	2·88	2·68	2·42	1·93	?	871·0	2·82
Zero in computing D.	1·96	2·53	2·86	2·87	3·09	3·00	3·16	2·94	3·05	3·09	2·91	3·13	3·13	3·03	2·83	2·43	2·11	Zero in computing D.	875·5	2·95
	2·16	2·61	2·75	2·78	2·83	2·83	2·97	2·97	2·82	2·97	3·16	2·94	3·09	2·99	2·67	2·38	2·15		847·9	2·86
	1·79	2·48	2·97	2·73	2·65	2·56	2·86	2·83	2·75	2·94	2·78	2·65	2·73	2·88	2·56	2·11	1·49		838·4	2·69
	1·49	2·31	2·86	2·86	2·80	2·94	2·53	2·94	2·86	2·94	3·05	2·80	2·70	2·80	2·63	2·40	1·74		862·5	2·77
	1·85	2·24	2·53	2·62	2·74	3·08	3·23	3·08	2·86	3·05	3·19	3·13	2·83	2·94	2·68	2·42	1·85		841·9	2·87
	1·26	2·15	2·48	2·80	2·70	2·91	2·69	2·87	2·75	3·06	2·93	2·88	2·86	2·78	2·42	1·99	1·85		817·5	2·72
	1·70	2·22	3·00	2·68	2·83	3·06	2·88	3·03	2·94	2·83	2·90	2·88	2·68	2·80	2·56	2·44	1·64		823·9	2·79
	1·65	2·21	2·68	2·70	2·75	2·91	2·80	2·80	2·83	2·94	3·00	3·06	3·06	2·65	2·63	2·51	1·86		817·7	2·78
	1·97	2·38	2·86	2·86	2·70	2·75	2·86	2·94	2·74	2·86	2·88	2·91	2·97	3·01	2·68	2·42	1·67		817·6	2·77
	1·45	2·27	2·80	3·00	2·80	2·91	2·91	2·97	3·30	2·72	2·97	3·06	3·00	2·80	2·86	2·07	2·10		803·1	2·84
	1·69	2·50	2·65	2·80	2·68	2·61	2·91	2·91	2·78	2·97	2·40	2·78	2·91	2·86	2·54	2·36	1·56		800·0	2·70
?	·90	·46	·52	·38	·44	·52	·70	·28	·56	·37	·79	·48	·45	·38	·44	·52	·66	?	75·5	·26
?	1·72	2·35	2·77	2·80	2·78	2·87	2·90	2·93	2·88	2·94	2·92	2·93	2·91	2·87	2·64	2·32	1·82	?	831·5	2·79

Digitized by Google

MEAN VELOCITIES

KAMHERIA

[*Instruments*—1″

Serial No.	1 Date, 1879.	2 Depth. At Gauge. h	Variation.	Date of Soundings.	Central. H	Hyd. Mean. R	Surface-Breadth. b	Wet Border. B	Area. A	3 Fall of Water-Surface. Upper 2½ miles. F_1	Lower 3½ miles. F_2	Local Slope. Left Bank. S	Right Bank. S	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.
Series 224.	21-1	5·61	·00	20-1	4·86	4·16	64·3	67·3	280·0	2·95	11·22	316	303	..	0	..	0	c
	22-1	·61	·00	„	·86	·16	·3	·3	280·0	2·92	11·25	313	301	N	13	N	15	cl
	10-2	·55	·00	12-2	·84	·17	·2	·4	281·2	2·78	11·16	316	306	V	*l*	V	*l*	c
	11-2	·55	·00	„	·84	·17	·2	·4	281·2	2·78	11·21	313	301	..	0	V	*l*	cl
	4-3	·55	·00	5-3	·80	·23	·5	·8	286·9	2·73	11·05	303	311	V	*l*	NW	15	cl
	22-2	·54	·00	19-2	·84	·24	·4	·8	287·1	2·79	11·18	308	291	..	0	..	0	c
	27-3	·54	·00	26-3	·92	·23	·4	·7	286·8	2·69	11·10	301	277	..	0	..	0	c
	13-2	·53	·00	12-2	·82	·16	·1	·3	279·9	2·80	11·16	313	294	N	14	N	14	c
	3-3	·53	·00	5-3	·78	·22	·5	·7	285·6	2·70	11·00	303	311	NW	19	NW	17	cl
	24-2	·47	·00	26-2	·68	·14	·1	·3	278·6	2·74	11·07	306	299	..	0	V	*l*	cl
	25-2	·45	·00	„	·66	·12	·0	·3	277·3	2·78	11·00	306	299	..	0	V	*l*	cl
	„	·45	·00	„	·66	·12	·0	·3	277·3	„	„	306	299	..	0	V	*l*	c
	δ Range,	·16	..	..	·26	·12	·5	·5	9·8	·26	·25	015	034	..	..	..	..	..
	v Means of 12,	5·53	..	..	4·80	4·18	64·3	67·5	281·8	2·79	11·12	304		NNW	4			..
Series 225.	14-2	5·41	·00	12-2	4·70	4·07	63·9	67·0	272·2	2·77	11·03	320	296	..	0	..	0	cl
	8-3	·41	+·01	5-3	·66	·12	64·2	·4	277·9	2·67	11·02	308	303	..	0	..	0	cl
	18-2	·40	·00	19-2	·70	·13	·1	·3	278·1	2·68	10·36	316	294	..	0	..	0	c
	17-2	·39	·00	„	·69	·12	·1	·3	277·5	2·69	11·05	320	296	..	0	..	0	cl
	10-3	·37	−·02	12-3	·48	·09	·1	·3	275·2	2·71	10·33	303	294	NNW	12	NNW	13	c
	13-3	·36	·00	„	·47	·08	·1	·2	274·6	2·72	10·82	303	294	..	0	..	0	c
	11-3	·35	·00	„	·46	·08	·1	·2	273·9	2·73	10·61	301	306	N	6	N	13	cl
	7-3	·33	·00	5-3	·58	·06	·1	·2	272·8	2·75	10·99	313	306	..	0	..	0	c
	15-2	·32	·00	12-2	·61	·00	63 7	66·7	266·4	2 71	10·28	325	311	SE	8	NE	6	c
	17-3	·31	−·01	19-3	·84	·08	64·1	67·1	274·2	2·72	10·57	303	299	NNW	16	NNW	18	c
	15-3	·30	·00	12-3	·41	·04	63·9	·0	270·7	2·73	10·26	308	296	N	3	V	*l*	cl
	20-2	·28	·00	19-2	·58	·04	·9	·0	270·4	2·80	10·44	313	301	V	*l*	V	*l*	cl
	6-3	·28	·00	5-3	·53	·02	64·0	·0	269·6	2·80	10·92	318	311	V	*l*	V	*l*	c
	18-3	·27	−·02	19-3	·80	·05	·1	·0	271·7	2·71	10·23	306	291	..	0	V	*l*	cl
	δ Range,	·14	..	..	·43	·13	·5	·7	11·7	·13	·82	024	020	..	..	..	..	..
	v Means of 14,	5·34	..	..	4·61	4·07	64·0	67·1	273·2	2·73	10·64	306		N 5 W	3			..

Digitized by Google

AND CUBIC DISCHARGES. TABLE LV.

SITE.

tin Tube-Rods].

6																		7	8
MEAN VELOCITIES past each vertical. [Each Velocity is the mean of three observations]																		CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.
Left of centre.								Centre.	Right of centre										
Edge	Side-slope m	Side-slope 27½	25	22½	20	15	10	5		5	10	15	20	22½	25	Side-slope 27½	Side-slope m	Edge	D	V
Assumed zero in computing Discharge.	1·74	2·29	2·67	2·70	2·99	2·84	2·96	2·91	3·00	2·88	2·90	2·75	2·86	2·83	2·63	2·07	1·84	Assumed zero in computing Discharge.	774·0	2·76
	1·81	2·61	2·79	2·80	2·80	3·00	2·83	3·06	3·00	2·80	2·73	2·97	2·97	2·97	2·65	2·46	2·04		794·0	2 84
	1·33	2·38	2·61	2·75	2·80	2·93	2·88	2·97	2·94	2·86	2·90	2·80	2 83	2·63	2·42	2·34	1·35		768·0	2·73
	1·33	2·27	2·64	2·78	2·84	3 00	2·83	3·03	2·84	2·88	2·83	2 88	2·82	2·61	2·39	2·40	1·41		772·4	2·73
	1·74	2·22	2·87	2·88	2·87	2·65	2·79	2·88	2·90	3·03	2·90	2·96	3·03	2·82	2·63	2·03	1·73		797·3	2·78
	1·74	2·34	2·63	2·80	2·75	2·68	2·80	2·83	2·73	2·75	3·05	3·01	3·03	2·88	2·58	2·07	1·61		809·0	2·82
	1·58	2·17	2·52	2·61	2·75	2·88	2·94	2·78	2·94	2·70	2·68	2·59	2·83	2·63	2·38	1·90	1·50		754·5	2 63
	1·90	2·41	2·73	2·74	2 88	2·91	2·80	3·06	3 01	2·91	3·09	3 09	2·70	2·68	2·40	2·11	1·56		785·7	2·81
	1·72	2·19	2·86	2·88	2·82	2·34	3·06	2·78	2·87	2·97	2·88	2·94	3·03	2 80	2·65	2·00	1·76		780·2	2·73
	1·76	2·10	2·56	2·63	2·59	2·73	2·80	2·76	2·91	2·91	2·83	2·88	2·73	2·67	2·51	2·19	1·51		744·1	2·67
	1·56	2·00	2·54	2·48	2·70	3·03	2·65	2·97	2·75	2·97	2·86	2·75	2·68	2 63	2·50	2·40	1·55		747·9	2·70
	1·76	1·94	2·61	2·54	2·65	2·97	2·78	2·73	2·97	2·87	2·86	2·86	2·68	2·68	2·44	2·17	1·70		745·1	2·69
?	·57	·67	·35	·40	·40	·69	·41	·33	·28	·33	·41	·50	·35	·36	·27	·56	·69	?	64·9	·21
?	1·66	2·24	2·67	2·72	2·79	2·83	2·84	2·90	2·91	2·88	2·88	2·87	2·85	2·74	2·52	2·18	1·63	?	772·7	2·74
Assumed zero in computing Discharge.	1·49	2·42	2·56	2·59	2·87	2·90	2·82	2·87	2·79	2·86	3·01	2·94	2·97	2·83	2·46	2·14	1·45	Assumed zero in computing Discharge.	746·2	2·74
	1·46	1·99	2·54	2·63	2·73	2·48	2·75	2·73	2·80	2·87	2·59	2·91	2·86	2·82	2·68	2·27	1·47		734·1	2·64
	1·79	2·05	2·63	2·56	2·52	2·75	2·70	2·94	3·06	3·00	2·78	2·86	2·99	2·86	2·61	2·24	1·55		760·7	2·74
	1·70	2·03	2·70	2·75	2·78	3·08	3·00	2·80	2·94	2·94	2·99	2·94	2·97	2·94	2·50	2·19	1·60		776·9	2·80
	1·61	2·27	2·86	2·78	2·83	2·80	2·48	2·80	2·80	2·83	2·75	2·91	2·73	2·68	2·63	2·26	1·49		743·5	2·70
	1·67	2·03	2·38	2·63	2·67	2·86	2·75	2·79	2·94	2·86	2·88	2·88	2·78	2·63	2·39	2·17	1·52		736·9	2·68
	1·60	2·11	2·61	2·75	2·73	2·83	2·83	2·94	2·78	2·73	2·48	3·03	2·94	2·94	2·68	2·22	1·49		747·7	2·73
	1·72	2·26	2·48	2·63	2·59	2·88	2·86	2·80	2·67	2·86	3·03	2·73	2·94	2 80	2·44	2·01	1·60		738·6	2·69
	1·60	2·20	2·83	2·73	2·80	2·78	2·96	3·23	2·52	2·97	3·00	2·83	2·94	2·63	2·65	2·27	1·43		739·2	2·78
	1·70	2·40	2 61	2·54	2·86	2·88	2·75	2·78	2·80	2·70	2·83	2·88	2·88	2·63	2·48	2·14	1·69		738·8	2·69
	1·60	2·03	2·65	2·75	2·52	2·84	2·86	2·80	2·73	2·87	2·70	2·78	2·82	2·73	2·55	2·11	1·61		725·8	2·68
	1·69	2·26	2·58	2·68	2·82	2·73	2·99	2·97	2·70	3·00	2·83	2·72	3·03	2·75	2·46	2·26	1·52		737·5	2·73
	1·58	2·29	2·59	2·59	2·70	2·97	2·46	2·65	2·75	2·73	2·56	2·78	2·86	2·91	2·46	2·17	1·59		711·4	2·64
	1·15	2·05	2·34	2·83	2·61	2·80	2·80	2·78	2·56	2·61	2·91	2·88	2·75	2·75	2·70	2·27	1·60		719·4	2·65
?	·64	·43	·52	·29	·35	·60	·54	·58	·54	·39	·55	·31	·30	·31	·31	·26	·26	?	65·5	·16
?	1·60	2·17	2·60	2·67	2·72	2·83	2·79	2·85	2·77	2 85	2·81	2·86	2·89	2·78	2·55	2·19	1·54	?	739·4	2·71

Digitized by Google

AVERAGE CROSS-SECTIONS, MEAN VELOCITIES AND CUBIC DISCHARGES. TABLE LVI.

SITES IN DISTRIBUTARIES.

[*Instruments*—11′ *Sounding Rod, and* 1″ *tin Tube-Rods.*]

Serial No.	1	2									3	4			5	6														7	8	9
		DEPTH.										WIND.				AVERAGE SOUNDINGS AND MEAN VELOCITIES for each vertical. [Each Average Sounding (H) is the mean of six soundings in a Float-Course]. * The "Range" of the Soundings is the difference between the greatest and least sounding in a Float-Course. [Each Velocity is the mean of three observations].													CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.	SITE.
	Date, 1879.	At Gauge.	Variation.	Date of Soundings.	Central.	Hyd. Mean.	Surface-Width.	Wet Border.	Area.	Fall of Water-Surface.	From Direction.	From Velocity.	To Direction.	To Velocity.	Timekeeper's Initial.	Nature of work.	Left of centre. Edge	10	8	6	4	2	Centre.	Right of centre. 2	4	6	8	10	Edge			
		h			H	R	*b*	B	A																					D	V	
	28-3	3·11	·00	28-3	2·58	2·00	22·0	23·5	46·9	?	..	0	..	0	..	Depths	..	·97	2·25	2·40	2·47	2·57	2·58	2·52	2·48	2·40	2·07	·80	..	..	..	
																* Range,	..	1·1	·3	·4	·3	·4	·5	·2	·1	·0	1·0	1·4	..	..	..	
231.	29-3	4·35	·00	28-3	3·82	2·79	25·0	27·2	76·0	?	..	0	..	0	C		?o	1·96	2·36	2·50	2·73	2·73	2·73	2·78	2·80	2·65	2·36	1·96	?o	190·7	2·51	
	,,	·34	+·02	,,	·81	·79	·0	·2	75·8	?	..	0	..	0	B		?o	1·99	2·36	2·54	2·86	2·73	2·61	2·70	2·73	2·63	2·48	2·21	?o	191·1	2·52	
	δ Range,	·01	..	..	·01	·00	·0	·0	·2	..	..	0	..	0	..	Velocities	?	·03	·00	·04	·13	·00	·12	·08	·07	·02	·12	·25	?	·4	·01	
	v Means of 2,	4·35	..	..	3·82	2·79	25·0	27·2	75·9	..		Calm			..		?	1·98	2·36	2·52	2·80	2·73	2·67	2·74	2·77	2·64	2·42	2·09	?	190·9	2·52	
232.	28-3	3·10	−·02	28-3	2·57	1·99	22·0	23·4	46·6	?	..	0	..	0	C		?o	1·60	1·73	2·13	2·17	2·31	2·40	2·33	2·11	2·11	1·96	1·63	?o	97·7	2·10	
	,,	·09	·00	,,	·56	·98	·0	·4	·4	?	..	0	..	0	B		?o	1·53	1·82	1·99	2·26	2·38	2·24	2·26	2·26	1·96	2·04	1·58	?o	97 7	2·10	
	δ Range,	·01	..	..	·01	·01	·0	·0	·2	..	..	0	..	0	..	Velocities	?	·07	·09	·14	·09	·07	·16	·07	·15	·15	·08	·05	?	·0	·00	
	v Means of 2,	3·10	..	..	2·57	1·99	22·0	23·4	46·5	..		Calm			..		?	1·57	1·78	2·06	2·22	2·35	2·32	2·30	2·19	2·04	2·00	1·61	?	97·7	2·10	RIGHT JAOLI DISTRIBUTARY, Gauge on Right Bank, 100′ below Site.

	Date.	*h*			H	R	*b*	B	A	D	V	D	V		Edge	6	5	4	3	2	1	Centre.	1	2	3	4	5	6	Edge	D	V	
	12-3	3·60	·00	12-3	3·08	2·10	13·8	16·9	35·5	?	..	0	..	0	..	Depths,	..	?	2·73	3·12	3·10	3·12	3·10	3·08	3·08	3·07	3·07	3·05	2·08	1·87	..	..	..	
															..	*Range,	..	?	·6	·2	·2	·2	·2	·3	·3	·2	·1	·3	·3	1·2	..	..	..	
	18-3	3·85	·00	18-3	3·38	2·28	14·0	17·4	39·7	?	..	0	..	0	..	Depths,	..	1·50	3·22	3·38	3·40	3·42	3·37	3·38	3·37	3·35	3·32	3·23	2·92	1·30	..	..	..	DISTRIBUTARY, 50′ below Site.
															..	*Range,	..	·9	·4	·2	·2	·2	·2	·3	·4	·3	·1	·3	2·1	..	..	..	

Digitized by Google

| | | |

SURFACE, BED AND MEAN VELOCITIES AND DISCHARGES. TABLE LVII.

Solání Right Aqueduct.

[*Instruments—3″ Surface-Floats, 3″ Double-Floats, and 1″ wood Rods*].

For explanation of this Table, see pages 57, 67. Series **241** is a reprint from Nos. **54, 55**; Series **242** from No. **66**; Series **243** partly from No. **111**; the work of 18-2-'76 in Series **243** is new matter.

Serial No.	Date, 1876.	2 Depth. Central. H	Variation.	Hyd. Mean. R	Surface-Breadth. b	Length of Instrument. l	3 Fall of Water-Surface. Upper 5 miles. F_1	Lower 4½ miles. F_2	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	6 Surface, Bed and Mean Velocities taken in succession past each vertical. Series 241, at the surface; Series 242, about 10½″ above the bed; Series 243, Rod velocities. [Each Velocity is the mean of three observations]. Left of centre. 42½	40	37½	35	32½	30	20	10	Centre.	Right of centre. 10	20	30	32½	35	37½	39½	42½	7 Discharge past each Transversal in sq. ft. per sec. D	8 Mean Velocity past each Transversal. U_o & V	U_H	Transversal.
241	19-2	8·95	+·08	7·41	83·7	..	5·75	5·00	SW	4	NW	15	H	?0	3·03	3·39	3·51	3·95	4·11	4·14	4·14	3·97	4·20	4·22	4·05	3·49	3·24	3·13	2·65	?0	325·2	3·83		
	18-2	8·78	+·05	7·30	83·9	..	5·92	4·88	..	0	SSW	25	W	?0	3·09	3·82	3·64	3 97	4·05	4·05	4·11	4·05	4·17	4·05	3·59	3·26	3·16	3·01	2·59	?0	320·9	3·78		
	δ Range,	·17	..	·11	·2	..	·17	·12	..	..	..	..	..	?	·06	·43	·13	·02	·06	·09	·03	·08	·03	·17	·46	·23	·08	·12	·06	?	4·3	·05		Surface.
	v Means of 2,	8·87	..	7·36	83·8	..	5·84	4·94	SW	δ	W	7	..	?	3·06	3·61	3·58	3·96	4·08	4·10	4·13	4·01	4·19	4·14	3·82	3·38	3·20	3·07	2·62	?	323·0	3·81		
242	19-2	8·95	+·08	7·41	83·7	8	5·75	5·00	SW	4	NW	15	H	?0	2·97	3·49	3·37	3·59	3·66	3·70	3·64	3·70	3·75	3·75	3·64	3·33	3·11	3·16	2·50	?0	298·2	3·51		
	18-2	8·78	+·05	7·30	83·9	8	5·92	4·88	..	0	SSW	25	W	?0	3·14	3·31	3·43	3·68	3·51	3·73	3·85	3·57	3·85	3·70	3·55	3·24	3·35	2·83	2·78	?0	295·5	3·48		
	δ Range,	·17	..	·11	·2	0	·17	·12	..	..	..	..	..	?	·17	·18	·06	·09	·15	·03	·21	·13	·10	·05	·09	·09	·24	·33	·28	?	2·7	·03		Bed.
	v Means of 2,	8·87	..	7·36	83·8	8	5·84	4·94	SW	δ	W	7	..	?	3·06	3·40	3·40	3·64	3·59	3·72	3·75	3·64	3·80	3·73	3·60	3·29	3·23	3·00	2·64	?	296·9	3·50		
243	19-2	8·95	+·08	7·41	83·7	8	5·95	5·00	SW	4	NW	15	H	?0	3·23	3·75	3·75	3·85	3·92	3·90	3·97	4·00	4·17	4·05	3·97	3·66	3·41	3·33	2·91	?0	321·8	3·79		
	18-2	8·78	+·05	7·30	83·9	8	5·92	4·88	..	0	SSW	25	W	?0	3·33	3·53	3·97	3·82	3·85	3·82	4·11	4·05	4·14	3·90	3·73	3·66	3·41	3·28	3·21	?0	318·8	3·75		
	δ Range,	·17	..	·11	·2	0	·17	·12	..	..	..	..	..	?	·10	·22	·22	·03	·07	·08	·14	·05	·03	·15	·24	·00	·00	·05	·30	?	3·0	·04		Mean.
	v Means of 2,	8·87	..	7·36	83·8	8	5·84	4·94	SW	δ	W	7	..	?	3·28	3·64	3·86	3·84	3·89	3·86	4·04	4·03	4·16	3·98	3·85	3·66	3·41	3·31	3·06	?	320·3	3·77		

Digitized by Google

TABLES LVIII.—LXX.

Central Surface and Mean Velocities.

Solání Left Aqueduct Site, ...	Series	101 to 107,	Table LVIII.
Solání Right Aqueduct Site, ...	„	108 to 127,	Tables LIX.—LXI.
Solání R. Aqueduct (with L. Aqued. closed),	„	131 to 139,	„ LXI.
Solání Embankment Main Site, ...	„	151 to 181,	„ LXII.—LXIV.
Fifteenth Mile Sites, ...	„	191 to 197,	„ LXV.
Belra Site, ...	„	201 to 206,	„ LXVI., LXVII.
Jaolí Site, ...	„	211 to 217,	„ LXVII., LXVIII.
Kamhera Site, ...	„	221 to 225,	„ LXIX.
Distributaries, ...	„	231 to 238,	„ LXX.

These Tables give the data for three different approximations to Mean (Sectional) Velocity (V), *viz.*

Col. 3,—as the quotient of Cubic Discharge ÷ Area, (D ÷ A).
„ 4,—by reduction of the Central Surface-Velocity (v_o) by a coefficient (c).
„ 5,—by computation from the local Surface-Slope (S) by formula C × 100 $(RS)^{\frac{1}{2}}$,

and additional data (Col. 2), showing the state of the Canal about same time.

Each line shows a Set of various data collected *nearly at same time*, complete under at least two of the approximations (Cols. 3, 4, or 5). Col. 3 is an Abstract from the Detailed Tables XXXIV. to LVI. of those Sets only, for which the data for Col. 4 or 5 were also collected. Such Sets as were done at nearly same water level, and do not differ greatly in the velocities, &c., are grouped together into one Series.

In any one Series the Sets are arranged by order of the hydraulic mean depth (R) corresponding to the Rod-velocity work (Col. 3): this hydraulic mean depth is in fact the "Argument" of these Tables.

The Series bear the same numbers (101 to 238) as those of the Detailed Tables for ready reference; those done at the same Site follow each other (by number) by order of depth of water as in those Tables: in a few cases the original Series have been split up into smaller Series (with same Serial No.) in these Tables.

The last two lines (marked δ, v) of each Series contain the following quantities for each Sub-column, *viz.*—

δ, "Range" (*i.e.*, difference between the greatest and least) of the quantities in the Sub-column.
v, Mean of the quantities in the Sub-column.

[*N.B.*—Col. 4 is incomplete in many Series (in the Roorkee Reach): the "Means" in this Column are in such cases queried (?) as not being strictly comparable with the rest (though otherwise correct in themselves)].

Explanation of the Columns.

Col.	Head.	Symbol.	Detail.	
2	State of Regulation.	Q	Number of Gates and of Ogees (small Gates) open in Dhanauri Dam.	controlling Supply into Roorkee Reach.
		k	Number of Gates closed in Dhanauri Regulator.	
			Withdrawal by Distributaries near Tail of Reach, in cub. ft. per sec.	
			Average Height of (temporary) Obstruction across Falls at Tail of Reach. (*i. e.*, sum of heights of obstructions in each bay of the Falls ÷ number of bays).	controlling exit at Tail of Reach.
		F_1	Fall of water-surface in upper Sub-Reach (Headworks to Experl. Site).	showing state of water in Reach.
		F_2	Fall of water-surface in middle Sub-Reach (Experl. Site to Solání Aqueduct).	
		F_3	Fall of water-surface in lower Sub-Reach (Experl. Site, or Solání Aqueduct to Tail of Reach).	
3	Rod-Velocity Results.	R	Hydraulic Mean Depth: this is the "Argument" of these Tables.	[extracted from the Detailed Tables XXXIV. to LVI. preceding].
			Variation of water-level during the Experiment.	
		b	Surface-breadth.	
		l	Length of Rod, (only for Solání Aqueduct).	
			Direction (referred to the current-axis as N. S. line), and velocity (in feet per sec.) of the Wind at beginning and end of each Set.	
			Timekeeper's Initial.	
		D	Cubic Discharge, in cub. feet per sec.	
		V	Mean (Sectional) Velocity, *i. e.*, the quotient D ÷ A.	
4	Central Surf. Vel. Results.	R	Hydraulic Mean Depth, and Variation of water-level during the Experiment.	[incomplete in many cases in Roorkee Reach].
			Direction and Velocity of the Wind (as above) at beginning and end of each Set.	
		v_o	Average Central Surface-Velocity, (mean of 48 measurements, freed of Observers' personal equation).	
		c	Value of ratio V ÷ v_o.	
5	Surface-Slope Results.	R	Hydraulic Mean Depth.	[Slope not observed in the Distributaries, Table LXX].
			Direction and Velocity of the Wind (as above), at time of Slope-measurement, (given twice when the Slope was measured on both banks).	
		S	Local Surface-Slope, (3 decimals, *i. e.*, ·000 to be prefixed by reader).	
			„ on one bank only in Roorkee Reach generally.	
			„ mean of both banks in Belra, Jaolí, and Kamhera Reaches.	
		w	Value of 100 $(RS)^{\frac{1}{2}}$, (in formula for mean velocity).	
		C	Value of ratio V ÷ 100 $(RS)^{\frac{1}{2}}$.	
6	Silt.	σ	Silt-Density at mid-channel (in grains per cub. ft.), given for Belra Site only.	

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

TABLE LVIII.

Soláni Left Aqueduct.

Serial No.	1	2						3												4							5				
		Control.				Fall of Water-Surface		Rod-Velocity Results.												Central Surface-Velocity Results.							Surface-Slope Results.				
	Date, 1877-78-79.	Headworks Dhanauri.		Tail Asafnagar.		Upper 5 miles.	Lower 4½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	Length of Rod.	Wind.				Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Hyd. Mean Depth.	Variation of water-level.	Wind.				Central Surface Velocity. (Mean of 48 trials).	Ratio $V \div v_0$.	Hyd. Mean Depth.	Wind.		Surface-Slope. (Left Bank).	Value of $100\sqrt{RS}$	Ratio $V \div u$.
		Gates open in Dam.	Gates closed in Regulator.	Withdrawn by Distributaries.	Average Obstruction.							From		To						From		To									
												Direction.	Velocity.	Direction.	Velocity.					Direction.	Velocity.	Direction.	Velocity.				Direction.	Velocity.			
				Q	k	F_1	F_2	R		b	l						D	V	R					v_0	c	R			m	s	C
101.	14-12-78	0	0	266	·00	5·95	5·57	7·99	− ·03	82·0	9	NE	4	S	9	Cl	3,429	4·03									7·99	NE	4	183	3·82	1·055
	20-12- „	0	0	228	·00	5·87	5·43	·92	− ·01	·5	9	..	0	W	3	Cl	3,441	4·12									·92	..	0	195	3·93	1·048
	19-12- „	0	0	228	·00	5·93	5·47	·91	− ·03	·0	9	SE	1	NE	5	C	3,409	4·04			No Observations.						·92	SE	1	190	3·88	1·041
	δ Range,	0	0	38	·00	·08	·14	·08	..	·5	0	..	..	..	..	..	32	·09									·07	..	..	012	·11	·014
	v Means of 3,	0	0	241	·00	5·92	5·49	7·94	..	82·2	9	SE ½ E 1				..	3,426	4·06									7·94	NE 1		189	3·88	1·048
103.	28-5-78	0	0	153	·00	5·92	5·18	7·69	·00	82·5	9	W	6	NW	7	R	3,107	3·86									7·69	W	6	205	3·97	·972
	12-4- „	0	0	100	·00	5·99	4·71	·65	+ ·12	·5	9	SE ½ S	7	NE	8	R	3,107	3·88									·62	SE ½ S	7	198	3·88	1·000
	27-5- „	0	0	123	·00	5·90	5·10	·64	·00	·5	9	SW ½ W	8	SW	8	T	3,126	3·91									·64	SW ½ S	8	210	4·01	·975
	15-4-79	0	0	115	·00	5·83	5·22	·62	+ ·03	·5	8½	NW	1	SW	12	B	3,034	3·82			No Observations.						·62	NW	1	215	4·05	·943
	δ Range,	0	0	53	·00	·16	·51	·07	..	·0	·5	..	..	..	..	..	92	·09									·07	..	..	017	·17	·057
	v Means of 4,	0	0	123	·00	5·91	5·05	7·65	..	82·5	8·9	SW ½ W 3				..	3,094	3·87									7·64	SSW 4		207	3·98	·973

Digitized by Google

105	6-4-78	0	0	0	146	·00	5·93	4·74	7·23	·00	84·0	8	NW	2	W	5	T	2,781	3·78							7·23	NW	1	225	4·03	·938
	20-3- „	0	0	0	0	·00	5·86	4·54	·14	− ·12	·1	8	SW	*l*	..	0	R	2,629	3·62							·18	SW	*l*	218	3·96	·914
	δ Range,	0	0	0	146	·00	·07	·20	·09	..	·1	0	..	..	..	..	..	152	·16	No Observations.						·05	..	..	007	·07	·024
	v Means of 2,	0	0	0	73	·00	5·90	4·64	7·19	..	84·1	8	W δ N 2				..	2,705	3·70							7·21	NW	1	222	4·00	·926
106.	21-3-78	0	0	0	0	·00	5·81	4·39	6·90	·00	85·0	7½	SE	3	..	0	T	2,465	3·54	..	..	..	..	..	..	?	?	6·90	SE	3	220	3·90	·908
	12-3- „	0	0	0	0	·00	5·85	4·20	·77	·00	·0	7½	SE	6	SE	2	T	2,377	3·50	..	..	..	..	..	..	?	?	·77	SE	6	210	3·77	·928
	6-3-77	0	2	0	113	·00	5·92	4·28	·75	·00	·0	7½	..	0	..	0	W	2,328	3·43	6·75	·00	..	0	N δ E	7	4·05	·847	·75	..	0	188	3·56	·963
	δ Range,	0	2	0	113	·00	·11	·19	·15	..	·0	0	..	..	..	..	..	137	·11	?	..	..	..	..	..	?	?	·15	..	..	32	·34	·055
	v Means of 3,	0	⅔	0	57	·00	5·86	4·29	6·81	..	85·0	7½	SE 2				..	2,390	3·49	?6·75	..	? N δ E	4			?4·05	?·847	6·81	SE	3	206	3·74	·933
107.	9-3-78	0	0	0	0	·00	5·89	3·96	6·46	+ ·02	85·0	7	..	0	N	3	T	2,230	3·47							6·45	..	0	220	3·77	·920
	8-3- „	0	0	0	0	·00	5·92	3·93	·43	− ·03	·0	7	SW	9	NW	4	R	2,228	3·48							·45	SW	9	223	3·79	·918
	11-3- „	0	0	0	0	·00	5·94	3·91	·42	·00	·0	7	..	0	..	0	R	2,211	3·46							·42	..	0	235	3·83	·892
	7-3- „	0	0	0	0	·00	5·90	3·90	·41	·00	·0	7	S	6	..	0	T	2,183	3·42							·41	S	6	223	3·78	·905
	δ Range,	0	0	0	0	·00	·05	·06	·05	..	·0	0	..	..	..	..	..	47	·06	No Observations.						·04	..	..	015	·11	·028
	v Means of 4,	0	0	0	0	·00	5·91	3·93	6·43	..	85·0	7	SW δ W 1				..	2,213	3·46							6·43	SSW	4	225	3·81	·909

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

TABLE LIX.

Solání Right Aqueduct.

Serial No.	1	2						3												4							5					
		Control.				Fall of Water-Surface		Rod-Velocity Results.												Central Surface-Velocity Results.								Surface-Slope Results.					
		Headworks Dhansuri.		Tail Asafnagar.								Wind.										Wind.								Wind.			
												From		To								From		To									
	Date, 1876-77-78-79.	Gates open in Dam.	Ogees open in Dam.	Gates closed in Regulator.	Withdrawn by Distributaries.	Average Obstruction.	Upper 5 miles.	Lower 4½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	Length of Rod.	Direction.	Velocity.	Direction.	Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Hyd. Mean Depth.	Variation of water-level.	Direction.	Velocity.	Direction.	Velocity.	Central Surface Velocity. [Mean of 46 trials].	Ratio $V \div v_0$.	Hyd. Mean Depth	Direction.	Velocity.	Surface-Slope. [Right Bank].	Value of $100\sqrt{RS}$	Ratio $V \div w$.
		Gates open in Dam.		Gates closed in Regulator.	Q	k	F_1	F_2	R	Variation of water-level.	b	l						D	V	R	Variation of water-level.					v_0	c	R			S	w	C
Series 108.	31-5-77	0	0	0	306	·00	5·89	5·66	8·00	− ·02	82·0	9½	..	0	NE	3	W	3,328	3·91	8·01	+ ·01	..	0	..	0	4·55	·859	8·00	..	0	189	3·89	1·005
	5-6-76	0	0	0	290	?·00	5·80	5·70	7·99	·00	·0	9	..	0	S	5	W	3,340	3·93	7·99	·00	..	0	..	0	4·53	·868	7·99	..	0	185	3·85	1·021
	14-12-78	0	0	0	266	·00	5·97	5·55	·97	·00	·0	9	S	9	..	0	Cl	3,651	4·30	..	..	..	..	..	..	?	?	·97	S	9	175	3·74	1·150
	17-6-76	0	2	0	302	?·00	5·87	5·68	·97	·00	·0	9	NE	6	NE	14	W	3,528	4·16	7·97	·00	V	10	NE	6	4·59	·906	·97	ENE	l	195	3·94	1·056
	14-6- „	0	0	0	302	?·00	5·83	5·67	·97	+ ·02	·0	9	NE	6	NE	8	H	3,424	4·04	·96	·00	E	8	NE	6	4·48	·902	·96	V	l	190	3·89	1·039
	5-6-77	0	0	0	98	·00	5·82	5·58	·97	·00	·0	9½	SW	7	N	8	W	3,385	3·99	·97	·00	..	0	SW	7	4·52	·883	·97	..	0	191	3·90	1·023
	6-6- „	0	0	0	98	·00	5·82	5·58	·97	·00	·0	9½	..	0	..	0	P	3,355	3·96	·97	·00	..	0	..	0	4·51	·878	·97	..	0	188	3·87	1·023
	20-12-78	0	0	0	228	·00	5·88	5·42	·91	− ·01	·5	9	W	4	SW	12	Cl	3,519	4·22	..	..	..	..	..	..	?	?	·92	SW	13	205	4·03	1·047
	19-12- „	0	0	0	228	·00	5·93	5·47	·90	·00	·0	9	NE	5	NE	l	C	3,444	4·11	..	..	..	..	..	..	?	?	·90	NE	l	200	3·98	1·033
	17-5-76	0	0	0	208	?·00	5·83	?	·90	− ·03	·0	9	..	0	NE	7	W	3,318	3·95	7·91	·00	..	0	..	0	4·43	·892	·91	..	0	180	3·77	1·048
	δ Range,	0	2	0	208	?·00	·17	?·28	·10	..	·5	·5	..	..	..	..	..	338	·39	?·10	..	..	..	..	..	?·16	?·047	·10	..	..	030	·29	·145
	τ Means of 10,	0	½	0	233	?·00	5·86	?5·59	7·96	..	82·1	9·2			NE 1		..	3,429	4·06	?7·97	..			? ENE 1		?4·52	?·884	7·96	SW 2		190	3·89	1·045
109	29-7-78	0	0	0	318	·00	6·07	5·23	7·82	+ ·05	82·5	9	..	0	s ŝ w	8	R	3,577	4·35	No Observations.								7·80	..	0	198	3·93	1·107

Digitized by Google

Series 109.	3-5-77	0	0	0	62	·00	5·80	4·95	7·80	·00	82·5	9	NE	6	..	0	W	3,104	3·78	7·80	·00	..	0	NE	12	4·43	·853	7·80	..	0	190	3·85	·982
	19-11-„	0	0	0	306	·00	6·07	5·28	·79	·00	·5	9	V	*l*	..	0	G	3,376	4·12	·79	·00	..	0	V	5	4.65	.886	·79	..	0	203	3·98	1·085
	11-5-76	0	0	0	238	?·00	5·82	5·43	·79	−·05	·5	9	..	0	..	0	W	3,163	3·86	·80	·00	..	0	..	0	4·44	.870	·80	..	0	195	3·90	·990
	15-5-„	0	2	0	208	?·00	5·82	5·43	·79	·00	·5	9	..	0	..	0	H	3,159	3·86	·79	·00	..	0	..	0	4·24	·910	·79	..	0	185	3·80	1·016
	12-5-„	0	3	0	208	?·00	5·85	5·40	·77	·00	·5	9	NE	11	NE	17	W	3,135	3·84	·77	·00	..	0	NE	11	4·38	·877	·77	..	0	190	3·84	1·000
	3-6-„	0	0	0	289	?·00	5·94	5·36	·75	−·12	·5	9	..	0	NE	10	W	3,141	3·87	·78	·00	..	0	..	0	4·46	·868	·78	..	0	185	3·79	1·021
	2-6-„	0	0	0	289	?·00	5·73	5·32	·72	−·04	·5	9	E	5	NE	9	H	3,147	3·89	·78	·00	V	*l*	V	*l*	4·43	·878	·78	..	0	195	3·88	1·003
	12-4-78	0	0	0	100	·00	5·89	4·81	·71	·00	·5	9	V	12	E	23	R	3,190	3·95	..	..	..	..	..	..	?	?	·71	E	23	190	3·83	1·031
	16-5-76	0	0	0	208	?·00	5·85	5·35	·70	·00	·5	9	..	0	NE	10	H	3,064	3·79	7·70	·00	NE	11	..	0	4·46	·850	·70	..	0	195	3·87	·979
	δ Range,	0	3	0	244	?·00	·34	·62	·10	..	·0	0	..	..	..	..	..	312	·34	?·10	..	..	..	..	..	?·41	?·060	·10	..	..	018	·19	·056
	v Means of 9,	0	4/9	0	212	?·00	5·86	5·26	7·76	..	82·5	9	NE *b* E 5				..	3,164	3·88	?7·77	..	? NE 2				?4·44	?·874	7·76	E	3	192	3·86	1·006
110	8-8-78	0	0	0	333	·00	6·21	4·94	7·63	−·03	82·5	8½	..	0	..	0	R	3,385	4·24	7·66	−·05	V	*l*	..	0	4·78	·887	7·67	V	*l*	203	3·95	1·073
Series 110.	28-5-78	0	0	0	153	·00	5·98	5·12	7·65	·00	82·5	9	NW	*l*	V	*l*	R	3,223	4·02	..	..	..	..	..	..	?	?	7·65	V	*l*	188	3·79	1·061
	15-4-79	0	0	0	115	·00	5·78	5·27	·65	+·05	·5	8½/9	V	*l*	SW	12	B	3,047	3·93	..	..	..	..	..	..	?	?	·65	SW	12	200	3·91	1·010
	8-5-76	0	2	0	238	?·00	5·85	5·25	·64	·00	·5	9	..	0	NE	12	W	3,067	3·83	7·63	+·03	..	0	..	0	4·23	·905	·62	..	0	205	3·95	·970
	27-5-„	0	0	0	123	·00	5·92	5·08	·63	·00	·5	9	S	8	SW	13	T	3,122	3·92	..	..	..	..	..	..	?	?	·63	SW	13	190	3·81	1·029
	3-6-„	0	0	0	289	?·00	6·11	5·19	·63	−·22	·5	9	NE	10	N	6	H	3,049	3·82	7·78	·00	..	0	..	0	4·46	·857	·78	..	0	185	3·79	1·008
	1-5-„	0	5	0	213	?·00	5·82	5·33	·62	−·05	·8	9	..	0	..	0	W	3,094	3·90	·62	·00	..	0	..	0	4·38	·890	·62	..	0	195	3·85	1·018
	3-5-„	0	2	0	213	?·00	5·85	5·25	·61	·00	83·0	9	..	0	..	0	W	3,001	3·80	·61	·00	..	0	..	0	4·25	·894	·61	..	0	195	3·85	·987
	2-5-„	0	5	0	213	?·00	5·85	5·25	·61	·00	·0	9	..	0	..	0	W	2,998	3·79	·61	−·03	..	0	..	0	4·34	·873	·62	..	0	195	3·85	·984
	28-4-„	0	2	0	233	? ·00	5·78	5·27	·59	·00	·1	9	..	0	..	0	H	2,955	3·75	·59	·00	..	0	..	0	4·33	·866	·59	..	0	190	3·80	·987
	29-4-„	0	4	0	213	?·00	5·80	5·25	·58	·00	·1	9	..	0	..	0	W	2,938	3·75	·58	·00	..	0	..	0	4.40	·852	·58	..	0	190	3·80	·987
	δ Range,	0	5	0	174	?·00	·33	·25	·07	..	·7	·5	..	..	..	..	..	285	·27	?·20	..	..	..	..	..	?·23	?·053	·20	..	..	020	·16	·091
	v Means of 10,	0	2	0	200	?·00	5·87	5·23	7·62	..	82·8	9	SSW *l*				..	3,049	3·85	?7·63	..	? Calm.				?4·34	?·877	7·64	SW	3	193	3·84	1·004
110	26-4-77	0	0	0	0	·00	5·75	5·10	7·58	·00	83·1	9	..	0	N	13	P	2,838	3·61	7·58	+·01	..	0	..	0	4·39	·822	7·58	..	0	183	3·73	·968
Series 111.	25-4-78	0	0	0	40	·00	5·87	4·90	7·46	·00	83·6	8½	N	7	..	*g*	P	2,832	3·69	..	..	..	..	..	..	?	?	7·46	N	10	193	3·79	·974
	20-4-„	0	0	0	0	·00	5·89	[illegible]	·45	·00	·6	8½	..	0	..	0	R	2,952	3·85	..	..	..	..	..	..	?	?	·45	..	0	194	3·80	1·013
	„ „	„	„	„	„	„	5·88	[illegible]	·45	·00	·6	8½	..	0	..	0	R	2,899	3·78	7·45	·00	..	0	..	0	4·29	·881	·45	..	0	188	3·74	1·011
	26-4-„	0	0	0	40	·00	5·90	[illegible]	·44	·00	·6	8½	N	9	V	*l*	P	2,875	3·76	·44	·00	SW	8	NW	9	4·34	·866	·44	W	11	195	3·81	·987
	15-7-76	0	0	0	299	?·00	5·92	[illegible]	·43	+·01	·6	8	..	0	E	17	H	3,095	4·06	·42	·00	..	0	..	0	4·58	·886	·42	..	0	195	3·80	1·068
	13-11-77	0	0	0	305	·00	6·04	4·46	·42	−·02	·7	8½	N	8	..	0	P	3,029	3·98	·41	·00	..	0	V	*l*	4·37	·911	·41	..	0	182	3·67	1·085
	23-5-76	0	0	0	181	?·00	5·85	4·95	·41	·00	·7	8	..	0	SW	4	H	2,873	3·78	·40	+·02	W	4	NE	6	4·37	·865	·40	..	0	195	3·80	·995
	14-7-„	0	0	0	299	?·00	5·90	4·90	·38	·00	·7	8	..	0	..	0	H	3,041	4·02	·38	·00	..	0	..	0	4·45	·903	·38	..	0	205	3·89	1·083
	δ Range,	0	0	0	305	?·00	·19	·52	·08	..	·1	·5	..	..	..	..	..	263	·37	?·07	..	..	..	..	..	?·29	?·046	·08	..	..	023	·22	·092
	v Means of 8,	0	0	0	146	?·00	5·91	4·87	7·43	..	83·6	8·3	NE *b* N 2				..	2,950	3·87	?7·42	..	? NW 1				?4·40	?·885	7·43	NW	2	193	3·79	1·021

CENTRAL SURFACE AND MEAN VELOCITIES. TABLE LX.

Solání Right Aqueduct.

Serial No.	1	2						3											4							5					
		Control.				Fall of Water-Surface		Rod-Velocity Results.											Central Surface-Velocity Results.													
		Headworks Dhansuri.		Tail Asafnagar.								Wind.									Wind.							Wind.				
	Date, 1876-77-78.	Gates open in Dam.	Ogees open in Dam.	Gates closed in Regulator.	Withdrawn by Distributaries.	Average Obstruction.	Upper 5 miles.	Lower 4½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	Length of Rod.	From Direction.	From Velocity.	To Direction.	To Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Hyd. Mean Depth.	Variation of water-level.	From Direction.	From Velocity.	To Direction.	To Velocity.	Central Surface Velocity. [Mean of 48 trials]	Ratio $V \div v_0$.	Hyd. Mean Depth.	Wind. Direction.	Wind. Velocity.	Surface-Slope. [Right Bank].	Value of $100\sqrt{RS}$	Ratio $V \div u$.
		Gates open in Dam.	Ogees open in Dam.	Gates closed in Regulator.	Withdrawn by Distributaries.	Average Obstruction.	Upper 5 miles.	Lower 4½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	Length of Rod.	From Direction.	From Velocity.	To Direction.	To Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Hyd. Mean Depth.	Variation of water-level.	From Direction.	From Velocity.	To Direction.	To Velocity.	Central Surface Velocity. [Mean of 48 trials]	Ratio $V \div v_0$.	Hyd. Mean Depth.	Wind. Direction.	Wind. Velocity.	Surface-Slope. [Right Bank].	Value of $100\sqrt{RS}$	Ratio $V \div u$.
		Q	k				F_1	F_2	R		b	l						D	V	R						v_0	c	R			S	u	C
112.	6-4-78	0	0	0	146	·00	5·93	4·74	7·23	·00	84·0	8	W	3	NW	3	T	2,892	3·92	..	..	..	..	..	..	?	?	7·23	NW	3	193	3·74	1·048
	13-7-76	0	0	0	298	?·00	5·90	4·60	·11	·00	·1	8	..	0	NNE	8	H	2,713	3·75	7·11	·00	..	0	..	0	4·43	·847	·11	..	0	220	3·96	·947
	20-3-78	0	0	0	0	·00	5·99	4·41	·06	– ·12	·2	8	WSW	5	WSW	l	R	2,677	3·74	..	..	..	..	..	..	?	?	·01	WSW	l	198	3·73	1·003
	δ Range,	0	0	0	298	?·00	·09	·33	·17	..	·2	0	..	..	..	..	..	215	·18	?	..	..	..	..	..	?	?	·22	..	..	027	·23	·101
	v Means of 3,	0	0	0	148	?·00	5·94	4·58	7·13	..	84·1	8	NW	2			..	2,761	3·80	?7·11	..	? Calm.				?4·43	?·847	7·12	NW	1	204	3·81	·999
113	21-3-78	0	0	0	0	·00	5·84	4·36	6·88	·00	84·3	7½	..	0	V	l	T	2,669	3·85	..	..	..	..	..	..	?	?	6·88	V	l	228	3·96	·972
114	4-4-76	0	6	0	67	?·00	5·80	4·30	·77	·00	·4	7	..	0	SSW	6	W	2,447	3·60	6·77	·00	..	0	..	0	3·97	·907	·77	..	0	205	3·73	·965
	6-3-77	0	2	0	113	·00	5·92	4·28	·75	·00	·4	7½	N b E	7	..	0	W	2,484	3·66	·75	·00	..	0	..	0	4·12	·888	·75	..	0	195	3·63	1·008
	12-3-78	0	0	0	0	·00	5·87	4·18	·75	·00	·4	7½	..	0	SE	8	T	2,465	3·63	..	..	..	..	..	..	?	?	·75	SE	8	195	3·63	1·000
115	26-6-76	0	0	0	261	?·00	5·85	4·35	·73	– ·06	·4	7	..	0	S	5	W	2,544	3·76	6·75	·00	..	0	..	0	4·28	·879	·75	..	0	210	3·77	·997
	9-10-77	0	0	0	172	·00	6·10	4·10	·63	·00	·4	7	..	0	..	0	G	2,561	3·86	·63	·00	..	0	..	0	4·37	·883	·63	..	0	198	3·62	1·066
	δ Range,	0	6	0	261	?·00	·30	·26	·25	..	·1	·5	..	..	..	..	..	222	·16	?·14	..	..	..	..	..	?·40	?·028	·25	..	..	033	·34	·101
	v Means of 6,	0	1	0	102	?·00	5·90	4·26	6·75	..	84·4	7·3	SSE	1			..	2,528	3·73	?6·73	..	? Calm.				?4·19	?·889	6·76	SE	1	205	3·72	1·001
116.	9-3-78	0	0	0	0	·00	5·90	3·95	6·45	·00	84·5	7	V	l	..	0	T	2,349	3·66	..	..	..	..	..	..	?	?	6·45	..	0	203	3·62	1·011
	11-3- „	0	0	0	0	·00	5·95	3·90	·41	·00	·5	7	..	0	..	0	R	2,305	3·62	..	..	..	..	..	..	?	?	·41	..	0	205	3·63	·997
	8-3- „	0	0	0	0	·00	5·95	3·90	·41	·00	·5	7	NW	6	NW	l	B	2,296	3·60	..	..	..	..	..	..	?	?	·41	NW	l	205	3·63	·992
	7-3- „	0	0	0	0	·00	5·90	3·90	·41	·00	·5	7	V	l	S	7	T	2,256	3·53	..	..	..	..	..	..	?	?	·41	S	7	213	3·70	·954
	8-11-77	0	0	0	287	·92	6·05	2·90	·34	·00	·5	7	V	l	V	13	G	2,269	3·61	6·34	·00	..	0	V	l	4·03	·896	·34	..	0	210	3·65	·989
	δ Range,	0	0	0	287	·92	·15	1·05	·11	..	·0	0	..	..	..	..	..	93	·13	?	..	..	..	..	..	?	?	·11	..	..	010	·08	·057
	v Means of 5,	0	0	0	57	·18	5·95	3·71	6·40	..	84·5	7	SW	b W 1			..	2,295	3·60	?6·34	..	? V l				?4·03	?·896	6·40	S	1	207	3·65	·989

Digitized by Google

117	5-11-77	0	0	0	279	·00	6·00	2·60	6·15	·00	85·0	6½	E	4	N	3	G	2,172	3·60	6·17	−·05	N	3	E	4	4·00	·900	6·19	N	3	209	3·60	1·000
	21-7-76	0	0	0	151	?·00	6·12	3·78	·13	+·05	·0	6	..	0	..	0	H	2,245	3·73	·11	·00	..	0	..	0	4·04	·923	·11	..	0	230	3·75	·995
	δ Range,	0	0	0	128	?·00	·12	1·18	·02	..	·0	·5	..	..	..	..	..	73	·13	·06	..	..	..	..	..	·04	·023	·08	..	..	021	·15	·005
	v Means of 2,	0	0	0	215	?·00	6·06	3·19	6·14	..	85·0	6·3	NE ½ N 2				..	2,209	3·67	6·14	..	NE ½ E 1				4·02	·912	6·15	N 2		220	3·68	·998
118.	19-7-76	0	0	0	234	?	5·99	3·56	5·97	−·02	85·0	6	..	0	NNE	7	H	2,157	3·70	5·98	·00	..	0	..	0	4·23	·875	5·98	..	0	230	3·71	·997
	12-1-78	0	0	0	22	·47	5·93	3·07	·83	·00	·0	6	E	7	N	8	P	2,044	3·61	·83	·00	V	l	S	4	3·91	·923	·83	V	l	215	3·54	1·020
	14-1-„	0	0	0	22	·47	6·02	3·08	·83	·00	·0	6	..	0	..	0	P	2,002	3·53	·83	·00	..	0	..	0	3·96	·891	·83	..	0	224	3·61	·978
	20-7-76	0	0	0	200	?	6·05	3·45	·81	·00	·0	6	..	0	N	9	W	2,029	3·59	·81	·00	..	0	..	0	4·13	·869	·81	..	0	230	3·66	·981
	δ Range,	0	0	0	212	?·00	·12	·49	·16	..	·0	0	..	..	..	..	..	155	·17	·17	..	..	..	..	..	·32	·054	·17	..	..	015	·17	·042
	v Means of 4,	0	0	0	120	?·47	6·00	3·29	5·86	..	85·0	6	NNE 3				..	2,058	3·61	5·86	..	S 1				4·06	·890	5·86	V l		225	3·63	·994
Series 119.	25-7-76	0	0	0	0	?	6·40	3·10	5·55	·00	85·0	6	..	0	..	0	H	1,908	3·56	5·55	·00	..	0	..	0	4·25	·888	5·55	..	0	240	3·65	·975
	16-10-78	0	0	0	234	·83	6·36	2·09	·50	+·02	·0	5⅓	..	0	..	0	P	1,974	3·72	·51	·00	V	l	..	0	4·28	·869	·49	..	0	180	3·14	1·185
	24-7-76	12	10	0	104	?	6·47	2·93	·41	+·05	·0	5	NE	10	..	0	W	1,977	3·79	·47	+·10	..	0	..	0	4·22	·898	·51	..	0	270	3·86	·982
	15-10-78	0	0	0	234	·83	6·42	1·98	·41	−·05	·0	5½	..	0	..	0	R	1,963	3·77	·38	−·02	..	0	..	0	4·18	·902	·43	..	0	188	3·20	1·178
	10-7-„	1	0	0	0	·00	6·79	2·41	·40	+·15	·0	5½	N	6	V	15	P	1,887	3·63	..	..	..	..	..	..	?	?	·32	N	6	273	3·81	·953
	26-7-76	0	0	0	0	?	6·30	2·80	·32	·00	·0	5	..	0	..	0	H	1,864	3·65	5·32	·00	..	0	..	0	4·11	·885	·32	..	0	250	3·65	1·000
	δ Range,	12	10	0	234	?·83	·49	1·12	·23	..	·0	·5	..	..	..	..	..	113	·23	?·23	..	..	..	..	..	?·17	?·064	·23	..	..	093	·72	·232
	v Means of 6,	2⅙	1⅔	0	95	?·55	6·46	2·55	5·43	..	85·0	5·4	NNE 1				..	1,929	3·69	?5·45	..	? V l				?4·21	?·878	5·44	N 1		234	3·55	1·046
119	9-7-78	0	0	0	0	·00	6·97	2·93	5·41	+·25	85·0	5½	..	0	..	0	R	2,107	4·04	No Observations.								5·32	..	0	313	4·08	·990
121	14-10-78	0	0	0	234	1·08	6·17	1·53	5·02	·00	85·0	5	..	0	..	0	R	1,627	3·40	5·02	·00	..	0	..	0	3·83	·888	5·02	..	0	180	3·01	1·130
	27-7-76	0	0	0	0	?	6·32	3·08	4·98	−·05	·0	5	..	0	S	6	W	1,639	3·46	·00	·00	..	0	..	0	3·97	·872	·00	..	0	300	3·87	·894
	δ Range,	0	0	0	234	?	·15	1·55	·04	..	·0	0	..	..	..	..	..	12	·06	·02	..	..	..	..	..	·14	·016	·02	..	..	120	·86	·236
	v Means of 2,	0	0	0	117	?1·08	6·25	2·31	5·00	..	85·0	5	S 2				..	1,633	3·48	5·01	..	Calm.				3·90	·880	5·01	Calm.		240	3·44	1·012

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

TABLE LXI.

Solání Right Aqueduct.

Serial No.	1	2						3														4							5					
		Control.				Fall of Water-Surface.		Rod-Velocity Results.														Central Surface-Velocity Results.							Surface-Slope Results.					
		Headworks: Dhansuri.		Tail: Asafnagar.								Wind.											Wind.								Wind.				
	Date, 1876-77-78.	Gates open in Dam.	Ogees open in Dam.	Withdrawn by Distributaries.	Average Obstruction.	Upper 5 miles.	Lower 4½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	Length of Rod.	From: Direction.	From: Velocity.	To: Direction.	To: Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Hyd. Mean Depth.	Variation of water-level.	From: Direction.	From: Velocity.	To: Direction.	To: Velocity.	Central Surface Velocity. [Mean of 48 trials].	Ratio $V \div v_0$.		Hyd. Mean Depth.	From: Direction.	From: Velocity.	Surface-Slope. [Right Bank]	Value of $100 \sqrt{RS}$	Ratio $V \div v$.
		Gates closed in Regulator.		Q	h	F_1	F_2	R		b	l						D	V	R							v_0	c	R			s	w	C
122	24-12-77	0 0	0	22	·67	5·65	1·75	4·07	+·05	85·0	4	S ½ W	7	..	0	G	1,030	2·72	..	..	..	..	..	..	?	?		4·09	..	0	195	2·82	·965
	,, 19-12- ,,	,, ,,	,,	,,	,,	5·68	1·72	·05	·00	·0	4	S	6	S ½ W	7	P	1,031	2·74	4·05	·00	..	0	S	6	3·07	·893		·05	V	7	203	2·87	·955
		0 0	,,	,,	,,	5·65	1·70	·03	·00	·0	4	SW	4	S	19	G	1,024	2·74	·03	·00	SW	6	SW	4	3·02	·907		·03	..	0	218	2·96	·926
δ Range,		0 0	0	2	·00	·03	·05	·04	..	·0	0	..	..	..	..	..	7	·02	?·02	..	..	..	..	..	?·05	?·014		·06	..	..	023	·14	·039
v Means of 3,		0 0	0	23	·67	5·66	1·72	4·05	..	85·0	4	S ½ W 7				..	1,025	2·73	?4·04	..	? SW ½ S 4				?3·05	?·900		4·06	V	l	205	2·88	·949
122	23-8-78	0 0	10	0	·00	6·37	2·23	4·05	+·05	85·0	4	N	7	E	8	P	1,219	3·24	4·09	+·03	E	8	S	10	3·72	·871		4·10	..	0	243	3·16	1·025
	,, ,, 22-7-76	,, ,,	,,	,,	,,	6·05	1·95	3·99	+·05	·0	3½	..	0	N	5	R	1,237	3·25	·04	+·03	N	5	N	7	3·75	·867		·01	N	5	260	3·23	1·006
		15 10	0	173	?	6·87	?1·78	·97	·00	·0	4	S	6	SE	4	H	1,214	3·30	3·97	+·03	..	0	..	0	3·79	·871		3·95	..	0	330	3·61	·914
δ Range,		15 10	10	173	?·00	·82	?·50	·08	..	·0	·5	..	..	..	..	..	23	·06	·12	..	..	..	..	..	·07	·004		·06	..	..	087	·45	·111
v Means of 3,		5 3½	6⅔	58	?·00	6·43	?1·97	4·00	..	85·0	3·8	ENE 2				..	1,223	3·26	4·03	..	E ½ N 1				3·75	·870		4·02	N	2	278	3·33	·982
124	31-7-76	8 0	8	0	?	6·61	1·29	3·26	−·12	85·0	3	..	0	N	9	W	722·1	2·43	3·24	−·08	..	0	..	0	2·90	·838		3·42	..	0	195	2·58	·942
125	16-7-78	3 0	10	0	·00	7·78	·42	1·95	−·04	85·0	1½	S	l	S	l	P	276·9	1·61	1·98	−·04	..	0	S	l	1·83	·880		2·00	..	0	203	2·01	·801
127	11-7-78	16 0	10	0	·50	7·40	?·00	·69	·00	84·3	½	S	11	S	8	P	35·5	·60	No Observations.									·74	S	11	113	·91	·660

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

Solání Right Aqueduct—Left Aqueduct Closed.

131	27-10-77	0	0	0	247	?4·30	3·60	·10	4·20	·00	85·0	4	SW	6	NE	5	P	491·7	1·26	4·17	− ·07	NE	5	NE	5	1·53	·824	4·13	NE	5	026	1·04	1·212
	" "	"	"	"	"	"	"	"	·20	·00	·0	4	..	0	SW	6	G	472·2	1·21	·20	·00	..	0	..	0	1·42	·852	·20	..	0	024	1·00	1·210
δ	Range,	0	0	0	0	?·00	·00	·00	·00	..	·0	0	..	..	..	..	..	19·5	·05	·03	..	..	..	..	..	·11	·028	·07	..	..	002	·04	·002
v	Means of 2,	0	0	0	247	?4·30	3·60	·10	4·20	..	85·0	4			NE	2	..	482·0	·74	4·19	..			NE	3	1·48	·883	4·17	NE	3	025	1·02	1·211
132	1-9-76	0	0	6	159	?	6·17	·98	3·67	− ·04	85·0	3	..	0	..	0	H	1,648	4·87	3·69	·00	..	0	..	0	5·79	·841	3·69	..	0	480	4·21	1·157
	" "	"	"	"	"	?	"	"	·63	− ·05	·0	3	..	0	..	0	W	1,597	4·78	·66	− ·01	..	0	..	0	5·68	·842	·66	..	0	465	4·13	1·157
δ	Range,	0	0	0	0	?	·00	·00	·04	..	·0	0	..	..	..	..	..	51	·09	·03	..	..	..	..	..	·11	·001	·03	..	..	015	·08	·000
v	Means of 2,	0	0	6	159	?	6·17	·98	3·65	..	85·0	3			Calm.		..	1,623	4·83	3·68	..			Calm.		5·74	·842	3·68	Calm.		473	4·17	1·157
135	21-9-78	0	0	8	71	1·33	6·22	·68	2·99	+ ·05	85·0	2½	..	0	..	0	P	865·6	3·20	3·03	+ ·03	..	0	..	0	3·60	·889	3·04	..	0	253	2·77	1·155
136	21-9-78	0	0	8	71	1·33	6·28	·62	2·94	+ ·03	85·0	2½	..	0	..	0	R	740·2	2·79	2·95	+ ·02	..	0	..	0	3·44	·811	2·92	..	0	208	2·46	1·134
137	31-8-76	0	0	8	78	?	6·47	·43	2·94	+ ·10	85·0	3	..	0	SW	12	H	667·8	2·51	2·89	+ ·03	..	0	..	0	3·19	·787	2·85	..	0	200	2·39	1·050
138	31-8-76	0	0	8	78	?	6·52	·18	2·72	+ ·05	85·0	2	..	0	..	0	W	620·7	2·54	2·68	+ ·05	..	·0	..	0	2·88	·882	2·61	..	0	145	1·95	1·303
139	20-9-78	0	0	8	50	1·24	5·89	·21	2·57	− ·02	85·0	2	NW	*l*	V	*l*	R	525·6	2·28	2·56	·00	V	*l*	S	*l*	2·67	·854	2·59	NW	*l*	168	2·09	1·097
	" "	"	"	"	"	"	6·00	·10	·47	·00	·0	2	V	*l*	S	5	P	467·0	2·11	·47	·00	S	5	SSW	6	2·42	·872	·47	V	*l*	133	1·81	1·166
δ	Range,	0	0	0	0	·00	·11	·11	·10	..	·0	0	..	..	..	..	..	58·6	·17	·09	..	..	..	..	..	·25	·018	·12	..	..	035	·28	·069
v	Means of 2,	0	0	8	50	1·24	5·95	·16	2·52	..	85·0	2			S	1	..	496·3	2·20	2·52	..			S *b* W	3	2·54	·863	2·53	V *l*		151	1·95	1·132

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

TABLE LXII.

Solání Embankment Main Site.

Serial No.	1	2							3													4								5					
		Control.				Fall of Water-Surface			Rod-Velocity Results.													Central Surface-Velocity Results.								Surface-Slope Results.					
		Headworks Dhanauri.		Tail Asafnagar.								Wind.											Wind.								Wind.					
	Date, 1876-77-78-79.	Gates open in Dam.	Ogees open in Dam.	Gates closed in Regulator.	Withdrawn by Distributaries.	Average Obstruction.	Upper 4 miles.	1 mile below Site.	Lower 4½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	From Direction.	From Velocity.	To Direction.	To Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Hyd. Mean Depth.	Variation of water-level.	From Direction.	From Velocity.	To Direction.	To Velocity.	Central Surface Velocity [Mean of 48 trials]	Ratio $V \div v_0$.	Hyd. Mean Depth.	Direction.	Velocity.	Surface-Slope. [Left Bank.]	Value of $100\sqrt{RS}$	Ratio $V \div w$.			
		Gates open in Dam.	Gates closed in Regulator.		Q	k	F_1	F_2	F_3	R		b						D	V	R						v_0	c	R			S	w	C			
151.	14-12-78	0	0	0	266	.00	4·74	1·18	5·60	9·37	−·05	171·0	E	7	..	0	A	7,364	4.09	9·35	−·03	S	7	..	0	4·61	·887	9·39	E	6	230	4·65	·880			
	18-12- „	0	0	0	268	.00	4·68	1·24	5·48	·36	−·01	169·8	S	5	E	7	P	7,344	4·11	·35	·00	E	7	..	0	4·70	·874	·36	S	5	225	4·59	·895			
	19-12- „	0	0	0	268	.00	4·70	1·28	5·42	·34	−·01	·8	E b S	8	E	12	P	7,002	3·93	..	..	..	..	..	..	?	?	·33	E	12	223	4·56	·862			
	„ „	„	„	„	„	„	4·72	„	5·40	·33	+·04	·8	E	4	E b S	8	A	7,197	4·04	..	..	..	..	..	..	?	?	·31	E	4	228	4·61	·876			
	20-12- „	0	0	0	268	.00	4·65	1·25	5·40	·30	−·01	·8	S	3	W	10	A	6,940	3·91	..	..	..	..	..	..	?	?	·30	S	3	228	4·61	·848			
	δ Range,	0	0	0	2	.00	·09	·10	·20	·07	..	1·2	..	..	..	..	..	424	·20	?	..	..	..	..	..	?·09	?·013	·09	..	..	007	·09	·047			
	v Means of 5,	0	0	0	268	.00	4·70	1·25	5·46	9·34	..	170·0	ESE 4				..	7,169	4·02	?·935	..	? SE 3				?4·66	?·881	9·34	ESE 5		227	4·60	·872			
Series 152.	18-12-76	0	1	0	285	?·00	4·83	1·12	5·60	9·23	.00	171·0	E	17	E	18	P	6,927	3·93	9·23	+·01	E b N	14	E	17	4·62	·851	9·22	..	0	200	4·29	·916			
	20-12- „	0	1	0	195	?·00	4·83	1·12	5·60	·23	+·01	·0	E	23	S	4	P	6,684	3·80	·23	−·01	E	14	E	23	4·60	·826	·23	..	0	194	4·23	·898			
	29- 5-78	0	0	0	123	.00	4·70	1·22	5·53	·23	−·07	·0	W	8	..	0	G	6,590	3·72	·26	.00	..	0	..	0	4·37	·851	·26	..	0	213	4·44	·888			
	22-12-76	0	0	0	195	?·00	4·80	1·15	5·55	·19	.00	·0	E	5	W	8	P	6,934	3·93	·19	.00	..	0	E	5	4·58	·858	·19	..	0	205	4·34	·906			
	19-12- „	0	1	0	285	?·00	4·81	1·09	5·65	·19	−·01	·0	..	0	SW	17	W	6,851	3·88	·19	·00	..	0	..	0	4·51	·860	·19	..	0	203	4·32	·898			
	15-12- „	0	1	0	285	?·00	4·81	1·14	5·65	·19	.00	·0	SW	9	S	23	P	6,746	3·82	.18	+·02	SW	10	SW	9	4·55	·840	·23	..	0	198	4·28	·893			
	28-12- „	0	0	0	195	?·00	4·74	1·26	5·40	·18	+·03	169·8	..	0	..	0	P	6,792	3.88	·17	+·01	..	0	..	0	4·49	·864	·17	..	0	214	4·43	·876			
	16-12- „	0	1	0	285	?·00	4·82	1·08	5·70	·18	+·02	171·0	ENE	12	E b S	14	W	6,776	3·84	·23	·00	..	0	ENE	12	4·63	·830	·23	..	0	200	4·30	·893			
	14-12- „	0	1	0	284	?·00	4·81	1·09	5·62	·17	+·02	169·8	SW	11	SW	25	W	6,738	3·86	.16	·00	S	9	SW	11	4·34	·890	·16	..	0	207	4·35	·887			
	29-12- „	0	0	0	130	?·00	4·76	1·19	5·45	·13	+·03	·8	..	0	..	0	P	6,389	3·67	·11	.00	..	0	..	0	4·46	·823	·11	..	0	213	4·41	·832			
	δ Range,	0	1	0	162	?·00	·13	·18	·30	·10	..	1·2	..	..	..	..	..	545	·26	·15	..	..	..	..	..	·29	·067	·15	..	..	020	·21	·084			
	v Means of 10,	0	½	0	226	?·00	4·79	1·15	5·58	9·19	..	170·6	SSE 4				..	6,743	3·83	9·20	..	ESE 3				4·52	·849	9·20	Calm.		205	4·34	·884			

Digitized by Google

153.	15-4-79	0	0	0	115	·00	4·60	1·22	5·23	9·00	+·15	168·7	W	9	W	25	P	6,185	3·64	9·00	+·04	W	6	W	15	4·32	·843	8·92	W	9	265	4·86	·749
	8-12-76	0	2	0	283	?·00	4·81	1·09	5·45	8·98	·00	·7	..	0	S	8	P	6,294	3·71	8·98	·00	..	0	..	0	4·56	·814	·98	..	0	203	4·27	·869
	28-5-78	0	0	0	123	·00	4·73	1·23	5·14	·92	−·01	·7	W	7	W	9	G	6,187	3·67	·91	−·02	NNW	5	N	*l*	4·27	·859	·92	W	10	243	4·66	·788
	12-4- „	0	0	0	100	·00	4·76	1·21	4·73	·90	·00	·7	E	8	E	8	G	6,162	3·67	..	..	..	..	..	..	?	?	·90	E	8	205	4·27	·859
	27-5- „	0	0	0	123	·00	4·68	1·24	5·08	·88	−·01	·7	V	*l*	V	*g*	P	6,231	3·72	8·88	−·03	WSW	16	SW	12	4·06	·916	·88	W	9	220	4·42	·842
	δ Range,	0	2	0	183	?·00	·21	·15	·72	·12	..	·0	..	..	..	..	..	132	·08	?·12	..	..	..	..	..	?·50	?·102	·10	..	..	062	·59	·120
	v Means of 5,	0	⅘	0	149	?·00	4·72	1·20	5·13	8·94	..	168·7	W δ S 4				..	6,212	3·68	?8·94	..	? W δ S 6				?4·30	?·858	8·92	W 4		227	4·50	·821
154.	7-12-78	0	0	0	206	·00	4·70	1·30	4·85	8·77	+·01	167·5	..	0	..	0	P	6,239	3·81	8·77	·00	..	0	..	0	4·58	·832	8·77	..	0	253	4·71	·809
	10-4- „	0	0	0	115	·00	4·62	1·28	4·90	·66	+·02	·5	V	*l*	..	0	G	5,869	3·68	..	..	..	..	..	..	?	?	·65	V	*l*	215	4·31	·854
	7-12-77	0	0	0	297	·00	4·72	1·30	4·78	·64	+·01	166·3	S	9	W	7	G	5,814	3·63	8·64	·00	S	4	S	9	4·35	·834	·64	..	0	220	4·36	·838
	δ Range,	0	0	0	182	·00	·10	·02	·12	·13	..	1·2	..	..	..	..	..	425	·18	?·13	..	..	..	..	..	?·23	?·002	·13	..	..	038	·40	·045
	v Means of 3,	0	0	0	206	·00	4·68	1·29	4·84	8·69	..	167·1	SW δ S 2				..	5,974	3·71	?8·71	..	? S 3				?4·47	?·833	8·69	V *l*		229	4·46	·832
Series 155.	8-4-78	0	0	0	126	·00	4·61	1·29	4·75	8·49	+·05	166·3	V	*l*	W	6	P	5,460	3·48	8·48	+·04	W	2	NW	2	4·25	·819	8·52	W	6	215	4·28	·813
	28-10- „	0	0	0	240	·00	5·01	1·34	4·45	·48	·00	·3	..	0	..	0	R	6,353	4·05	·48	·00	..	0	..	0	4·68	·865	·48	E	7	248	4·59	·882
	4-4- „	0	0	0	113	·00	4·63	1·27	4·75	·47	+·01	·3	W	6	..	0	P	5,617	3·58	·47	−·01	W	4	W	3	4·13	·867	·47	W	6	217	4·29	·884
	6-4- „	0	0	0	146	·00	4·68	1·25	4·74	·43	·00	·3	W	6	W	6	G	5,379	3·45	·43	·00	V	*l*	V	*l*	4·12	·837	·43	W	6	215	4·26	·810
	29-3- „	0	0	0	0	·00	4·70	1·20	4·70	·41	−·02	·3	W	20	W	19	P	5,365	3·45	·43	·00	W	19	W	23	3·86	·894	·42	W	20	205	4·16	·829
	20-3- „	0	0	0	0	·00	4·70	1·22	4·48	·25	−·21	·3	SW	*l*	WSW	*l*	G	5,212	3·42	..	..	..	..	..	..	?	?	·34	SW	*l*	199	4·07	·840
	δ Range,	0	0	0	240	·00	·40	·14	·30	·24	..	·0	..	..	..	..	..	1,141	·63	?·05	..	..	..	..	..	?·82	?·075	·18	..	..	049	·52	·072
	v Means of 6,	0	0	0	104	·00	4·72	1·26	4·65	8·42	..	166·3	W 5				..	5,564	3·57	?8·46	..	? W 5				?4·21	?·856	8·44	W 5		217	4·28	·835
156	29-1-77	0	0	0	22	?·00	3·91	2·06	3·98	8·25	−·02	165·2	..	0	E	7	W	4,930	3·26	8·25	+·02	..	0	..	0	3·94	·827	8·25	..	0	223	4·29	·760
157.	21-3-78	0	0	0	0	·00	4·59	1·23	4·38	8·11	·00	164·0	SE	3	V	*l*	G	5,070	3·44	8·11	+·20	..	0	..	0	4·15	·829	8·11	SE	3	204	4·07	·845
	3-3-77	0	1	0	22	·00	4·65	1·25	4·35	·02	·00	·0	S	4	..	0	W	4,750	3·26	·02	+·03	..	0	..	0	3·99	·817	·01	..	0	228	4·27	·763
	6-3- „	0	2	0	113	·00	4·65	1·28	4·27	7·98	+·01	·0	NW	10	..	0	W	4,594	3·18	7·98	−·01	..	0	N	*l*	3·99	·797	7·98	..	0	215	4·14	·768
	12-3-78	0	0	0	0	·00	4·63	1·23	4·19	·95	·00	·0	SE	6	SE	8	P	4,826	3·35	·95	·00	SE	2	..	0	3·94	·858	·95	SE	6	200	3·99	·840
	δ Range,	0	2	0	113	·00	·06	·05	·19	·16	..	·0	..	..	..	..	..	476	·26	·16	..	..	..	..	..	·21	·061	·16	..	..	028	·28	·082
	v Means of 4,	0	¼	0	34	·00	4·63	1·25	4·30	8·02	..	164·0	SE δ S 1				..	4,810	3·31	8·02	..	SE *l*				4·02	·825	8·01	SE 2		212	4·12	·804

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

TABLE LXIII.

Solání Embankment Main Site.

Serial No.	1	2							3											4								5					
		Control.				Fall of Water-Surface			Rod-Velocity Results.											Central Surface-Velocity Results.								Surface-Slope Results.					
		Headworks Dhanauri.		Tail Asafnagar.								Wind.									Wind.								Wind.					
												From		To							From		To										
	Date, 1876-78.	Gates open in Dam.	Ogees open in Dam.	Gates closed in Regulator.	Withdrawn by Distributaries.	Average Obstruction.	Upper 4 miles.	1 mile below Site.	Lower 4½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	Direction.	Velocity.	Direction.	Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Hyd. Mean Depth.	Variation of water-level.	Direction.	Velocity.	Direction.	Velocity.	Central Surface Velocity. (Mean of 48 trials)	Ratio $V \div v$.	Hyd. Mean Depth.	Direction.	Velocity.	Surface Slope. (Left Bank)	Value of $100\sqrt{RS}$	Ratio $V \div w$.
		Q	h				F_1	F_2	F_3	R		b						D	V	R						v	c	R			S	w	C
158	13-9-76	0	0	0	197	?·00	4·73	1·17	4·35	7·88	+·28	164·0	..	0	W	17	H	4,893	3·43	7·77	·00	..	0	..	0	4·30	·798	7·77	..	0	215	4·09	·839
	11-9- „	0	0	0	194	?·00	4·88	1·32	4·10	·80	−·03	·0	..	0	E	4	H	4,828	3·42	·81	+·01	..	0	..	0	4.20	·814	·80	..	0	215	4·10	·834
	δ Range,	0	0	0	3	?·00	·15	·15	·25	·08	..	·0	..	..	..	..	..	65	·01	·04	..	..	..	..	..	·10	·016	·03	..	..	000	·01	·005
	v Means of 2,	0	0	0	196	?·00	4·81	1·25	4·23	7·84	..	164·0	W	3			..	4,861	3·43	7·79	..	Calm.				4·25	·806	7·79	Calm.		215	4·10	·837
Series 159.	9-9-76	0	0	0	207	?·00	4·85	1·35	3·95	7·71	−·04	162·8	..	0	S	14	W	4,698	3·40	7·73	·00	..	0	..	0	4·17	·815	7·73	..	0	215	4·08	·834
	9-3-78	0	0	0	0	·00	4.65	1·25	3·95	·67	−·02	·8	..	0	..	0	P	4,418	3·21	..	..	..	..	..	..	?	?	·68	..	0	214	4·05	·793
	8-3- „	0	0	0	0	·00	4·67	1·25	3·93	·65	−·01	·8	W	10	V	1	P	4,436	3·23	..	..	..	..	..	..	?	?	·66	W	9	211	4·02	·803
	7-3- „	0	0	0	0	·00	4·62	1·28	3·90	·65	·00	·8	S δ W	6	W	7	G	4,373	3·19	..	..	..	..	..	..	?	?	·65	S δ W	6	213	4·04	.790
	12-9-76	0	0	0	195	?·00	5·64	1·16	4·05	·64	−·03	·8	..	0	NE	17	W	4,593	3·36	7·67	·00	..	0	..	0	4·16	·808	·67	..	0	210	4·01	·838
	11-3-78	0	0	0	0	·00	4·68	1·26	3·91	·64	−·01	·8	..	0	..	0	G	4,452	3·25	..	..	..	..	..	..	?	?	·65	..	0	218	4·08	·797
	8-9-76	1	0	0	219	?·00	4·92	1·23	3·95	·62	·00	161·7	..	0	ENE	5	H	4,584	3·38	7·61	+·04	..	0	..	0	4·13	·818	·59	..	0	220	4·09	·827
	δ Range,	1	0	0	219	?·00	1·02	·19	·15	·09	..	1·1	..	..	..	..	..	325	·21	?·12	..	..	..	..	..	?·04	?·010	·14	..	..	010	·08	·048
	v Means of 7,	½	0	0	89	?·00	4·86	1·25	3·95	7·65	..	162·6	SSW	½			..	4,508	3·29	?7·67	..	? Calm.				?4·15	?·814	7·66	SW δ W	2	243	4·05	·812
Series 160.	25-5-78	0	0	0	62	·00	4·53	1·34	3·63	7·36	+·09	161·7	..	0	V	½	G	4,162	3·19	7·34	+·03	..	0	..	0	3·56	·896	7·32	..	0	218	3·99	·799
	22-2- „	0	0	0	0	·00	4·68	1·31	3·56	·28	+·06	·7	W	6	W	15	P	4,153	3·21	..	..	..	..	..	..	?	?	·31	W	15	208	3·90	·826
	„ „	„	„	„	„	„	4·71	1·34	3·50	·26	−·01	·7	E δ S	4	S	7	P	4,093	3·19	..	..	..	..	..	..	?	?	·27	S δ E	4	218	3·98	·802
	„ „	„	„	„	„	„	„	„	„	.26	−·01	·7	S	7	W	6	G	4,086	3·18	..	..	..	..	..	..	?	?	·26	W	6	213	3·93	·809
	6-2- „	0	0	0	22	·00	4·71	1·27	3·47	·21	·00	160·5	W	8	W δ S	14	G	4,154	3·28	7·21	·00	W	8	W	8	3·71	·884	.20	W δ S	14	210	3·89	·843
	8-2- „	0	0	0	22	·00	4·65	1·29	3·41	·18	−·02	·5	N	7	N	4	G	4,072	3·23	..	..	..	..	..	..	?	?	·18	N	7	214	3·92	·824
	δ Range,	0	0	0	62	·00	·18	·07	·22	·18	..	1·2	..	..	..	..	..	90	·10	?·13	..	..	..	..	..	?·15	?·12	·14	..	..	010	·10	·044
	v Means of 6,	0	0	0	18	·00	4·67	1·32	3·51	7·26	..	161·3	W δ S	4			..	4,120	3·22	?7·28	..	? W	4			?3·64	?·890	7·26	W	6	214	3·94	·817

Digitized by Google

161.	19-2-78	0	0	0	0	·00	4·64	1·31	3·40	7·15	−·01	159·3	S	4	..	0	P	3,958	3·18	..	..	..	..	..	..	?	?	7·15	..	0	219	3·96	·803
	„ „	„	„	„	„	„	„	„	„	·15	+·01	·3	..	0	S	4	G	3,909	3·14	7·14	+·01	..	0	..	0	3·69	·851	·14	..	0	217	3·94	·797
	18-2-„	0	0	0	22	·00	4·65	1·30	3·40	·14	·00	·3	E b S	10	E b S	4	P	3,811	3·06	..	..	..	..	..	..	?	?	·14	E b S	12	215	3·92	·781
	20-2-„	0	0	0	0	·00	4·63	1·32	3·40	·11	−·02	·3	S	9	WNW	8	G	3,834	3·07	..	..	..	..	..	..	?	?	·15	WNW	8	218	3·90	·787
	14-2-„	0	0	0	22	·00	4·68	1·27	2·90	·03	·00	·3	S	8	S	18	P	3,803	3·11	..	..	..	..	..	..	?	?	·08	S	11	219	3·92	·793
δ	Range,	0	0	0	22	·00	·05	·05	·50	·12	..	0	..	..	..	..	..	155	·12	?	..	..	..	..	..	?	?	·12	..	..	006	·06	·022
v	Means of 5,	0	0	0	9	·00	4·65	1·30	3·30	7·12	..	159·3	S b E	4			..	3,863	3·11	?7·14	..	? Calm.				?3·69	?·851	7·12	SSE	2	217	3·93	·792
162.	9-11-76	0	0	0	0	?·00	5·01	1·14	3·25	6·90	+·02	159·3	..	0	..	0	W	4,015	3·36	6·90	−·03	..	0	..	0	3·94	·853	6·91	..	0	275	4·36	·771
	2-2-78	0	0	0	22	·00	4·94	1·26	2·95	·87	−·01	·3	S	9	S	9	G	3,750	3·15	·88	−·01	V	l	S	9	3·54	·890	·87	S	9	217	3·86	·816
	8-11-76	0	0	0	0	?·00	5·01	1·09	3·25	·77	−·02	·3	..	0	..	0	P	4,092	3·49	·77	·00	..	0	..	0	3·91	·893	·77	..	0	285	4·39	·795
	24-10-„	0	0	0	19	?·00	5·25	1·10	3·15	·70	−·01	·3	..	0	ENE	7	P	3,944	3·41	·70	·00	..	0	..	0	4·26	·800	·70	..	0	170	3·38	1·009
	„ „	„	„	„	„	„	5·27	„	3·18	·68	−·02	·3	ENE	7	NE	4	W	4,062	3·52	·73	+·01	..	0	..	0	4·40	·800	·72	..	0	160	3·28	1·073
δ	Range,	0	0	0	22	?·00	·33	·17	·30	·22	..	0	..	..	..	..	..	342	·37	·20	..	..	..	..	..	·86	·093	·21	..	..	125	1·11	·302
v	Means of 5,	0	0	0	12	?·00	5·10	1·14	3·15	6·78	..	159·3	SE b E	2			..	3,973	3·39	6·80	..	S 1				4·01	·847	6·79	S	2	221	3·85	·893
163.	21-10-76	0	0	0	0	?	5·07	1·23	2·70	6·25	−·01	157·0	..	0	..	0	H	3,342	3·15	6·25	·00	..	0	..	0	3·58	·880	6·25	..	0	155	3·11	1·013
	„ „	„	„	„	„	?	5·11	„	2·66	·22	−·02	·0	..	0	S	6	W	3,286	3·12	·24	−·02	..	0	..	0	3·51	·889	·24	..	0	150	3·06	1·020
	19-10-„	0	0	0	0	?	5·17	1·23	2·60	·17	+·01	·0	W	12	SW	4	W	3,127	2·99	·16	·00	..	0	N b E	5	3·59	·833	·16	..	0	195	3·47	·862
	„ „	„	„	„	„	?	5·13	„	2·59	·16	·00	·0	W	7	..	0	H	3,189	3·06	·16	·00	..	0	..	0	3·60	·850	·16	..	0	200	3·51	·872
	20-10-„	0	0	0	0	?	5·08	1·22	2·60	·16	−·01	·0	..	0	..	0	H	3,166	3·04	·16	+·01	..	0	..	0	3·67	·828	·16	..	0	165	3·19	·958
	„ „	„	„	„	„	?	5·12	„	2·56	·13	−·01	·0	..	0	..	0	W	3,055	2·95	·14	−·02	..	0	..	0	3·63	·813	·15	..	0	160	3·14	·939
δ	Range,	0	0	0	0	?	·10	·01	·14	·12	..	·0	..	..	..	..	..	287	·20	·11	..	..	..	..	..	·16	·076	·10	..	..	050	·45	·158
v	Means of 6,	0	0	0	0	?	5·11	1·23	2·62	6·18	..	157·0	WSW	2			..	3,194	3·05	6·19	..	N b E l				3·60	·849	6·19	Calm.		171	3·25	·943
165.	10-10-76	0	0	0	214	?	4·88	·97	1·30	5·78	+·03	154·7	NW	6	..	0	P	2,485	2·60	5·78	−·01	..	0	..	0	3·02	·861	5·78	..	0	170	3·14	·828
	„ „	„	„	„	„	?	4·91	·94	„	·75	+·02	·7	..	0	NW	6	W	2,492	2·62	·74	·00	..	0	..	0	2·97	·882	·74	..	0	180	3·21	·816
	11-10-„	0	0	0	214	?	4·63	·77	1·20	·69	−·03	·7	..	0	E	14	P	2,278	2·42	·69	·00	..	0	..	0	2·80	·864	·69	..	0	140	2·82	·858
	„ „	„	„	„	„	?	4·67	·78	„	·65	·00	·7	..	0	..	0	W	2,228	2·38	·65	·00	..	0	..	0	2·87	·829	·65	..	0	155	3·00	·793
δ	Range,	0	0	0	0	?	·28	·24	·10	·13	..	·0	..	..	..	..	..	264	·24	·13	..	..	..	..	..	·22	·053	·13	..	..	040	·39	·065
v	Means of 4,	0	0	0	214	?	4·77	·85	1·25	5·72	..	154·7	NE b N	1			..	2,371	2·51	5·72	..	Calm.				2·92	·859	5·72	Calm.		161	3·04	·824

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

TABLE LXIV.

Solání Embankment Main Site.

Serial No.	1	2							3											4							5					
		Control.					Fall of Water-Surface.			Rod-Velocity Results.										Central Surface-Velocity Results.								Surface-Slope Results.					
		Headworks Dhanauri.		Tail Asafnagar.									Wind.									Wind.											
													From		To							From		To									
	Date, 1876-77-78.	Gates open in Dam.	Ogees open in Dam.	Gates closed in Regulator.	Withdrawn by Distributaries.	Average Obstruction.	Upper 4 miles.	1 mile below Site	Lower 4½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	Direction.	Velocity.	Direction.	Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity	Hyd. Mean Depth.	Variation of water-level.	Direction.	Velocity.	Direction.	Velocity.	Central Surface Velocity [Mean of 48 trials]	Ratio $V \div v_0$.	Hyd. Mean Depth.	Direction.	Velocity.	Surface-Slope. [Left Bank]	Value of $100\sqrt{RS}$	Ratio $V \div v_0$.
		Q	k				F_1	F_2	F_3	R		b						D	V	R						v_0	e	R			s	s	C
166	9-10-76	0	0	0	172	?	4·87	·88	1·35	5·39	– ·02	152·3	..	0	E	12	P	2,100	2·40	5·40	– ·01	..	0	..	0	2·81	·854	5·40	..	0	155	2·89	·830
167	7-10-76	0	0	0	137	?	4·65	·75	1·30	5·05	– ·02	152·3	..	0	NE	5	P	1,686	2·06	5·06	·00	..	0	..	0	2·36	·873	5·06	..	0	205	3·22	·640
	14-2-77	0	0	0	16	·50	4·70	1·05	1·70	·00	·00	151·2	..	0	S	10	W	1,759	2·20	·00	·00	..	0	..	0	2·36	·932	·00	..	0	185	3·04	·712
	δ Range,	0	0	0	121	?	·05	·30	·40	·05	..	1·1	..	..	..	..	..	73	·14	·06	..	..	..	..	..	·00	·059	·06	..	..	020	·18	·072
	v Means of 2,	0	0	0	77	?·50	4·68	·90	1·50	5·03	..	151·8	SE b S 2					1,723	2·13	5·03	..	Calm.				2·36	·903	5·03	Calm.		195	3·13	·676
169	6-10-76	0	0	0	59	?	4·67	·93	1·00	4·84	·00	150·0	..	0	..	0	P	1,469	1·91	4·84	·00	..	0	..	0	2·00	·955	4·84	..	0	200	3·11	·614
	5-10- ,,	0	0	0	60	?	4·71	1·49	0·40	·81	– ·01	·0	..	0	..	0	W	1,420	1·86	·81	+·01	..	0	..	0	2·06	·903	·82	..	0	200	3·11	·599
	δ Range,	0	0	0	1	?	·04	·56	·60	·03	..	·0	..	..	..	..	..	49	·05	·03	..	..	..	..	..	·06	·052	·02	..	..	000	·00	·015
	v Means of 2,	0	0	0	60	?	4·69	1·21	·70	4·83	..	150·0	Calm.				..	1,445	1·89	4·83	..	Calm.				2·03	·929	4·83	Calm.		200	3·11	·607
170	25-9-76	0	0	0	136	?	4·40	·70	·60	4·72	– ·06	150·0	..	0	..	0	H	1,152	1·54	4·75	+·01	V	l	..	0	1·82	·846	4·76	..	0	165	2·80	·550
171	31-10-77	0	0	0	263	?4·30	3·66	·24	·10	4·76	+·01	150·0	S	4	S	17	G	704·9	·93	4·76	+·01	SE	5	S	4	·92	1·011	4·76	SE	5	038	1·35	·689

Digitized by Google

173.	2-10-78	0	0	8	232	2·08	4·34	·41	·10	3·88	−·01	150·0	..	0	E	11	R	852·7	1·40	..	..	..	..	..	..	?	?	3·89	..	0	098	1·90	·737
	8-10-„	0	0	8	232	2·08	4·24	·41	·10	·88	·00	·0	..	0	SW	17	R	828·7	1·36	3·88	·00	..	0	..	0	1·53	·889	·88	..	0	090	1·87	·727
	3-10-„	0	0	8	232	2·08	4·31	·39	·10	·86	−·02	·0	E	6	E	9	P	794·4	1·31	·87	·00	..	0	E	6	1·56	·840	·87	..	0	088	1·85	·708
	4-10-„	0	0	8	232	2·08	4·34	·41	·05	·84	·00	·0	E	8	E	12	R	820·7	1·36	·85	−·01	..	0	E	8	1·54	·883	·85	..	0	083	1·79	·760
	7-10-„	0	0	8	232	2·08	4·24	·41	·10	·84	−·02	·0	..	0	N	8	P	806·1	1·34	·85	·00	..	0	..	0	1·52	·882	·85	..	0	085	1·81	·740
	δ Range,	0	0	0	0	·00	·10	·02	·05	·04	..	·0	..	..	..	..	..	58·3	·09	?·03	..	..	..	..	..	?·04	?·049	·04	..	..	010	·11	·052
	v Means of 5,	0	0	8	232	2·08	4·29	·41	·09	3·86	..	150·0	E & S 3				..	820·5	1·35	?3·86	..	? E 2				?1·54	?·874	3·87	Calm.		088	1·84	·734
174	26-9-76	0	0	0	106	?	4·59	·51	·60	4·20	−·27	150·0	..	0	..	0	W	887·6	1·34	4·33	+·02	..	0	..	0	1·52	·882	4·34	..	0	125	2·33	·575
175	4-10-76	0	0	0	0	?	5·06	1·14	1·40	4·05	+·05	150·0	..	0	..	0	H	1,155	1·82	4·03	·00	..	0	..	0	1·86	·978	4·03	..	0	215	2·94	·618
176	26-9-78	3	0	8	109	2·09	5·00	·70	·30	3·28	·00	150·0	E	8	E	18	P	842·7	1·65	..	..	..	..	..	..	?	?	3·28	E	8	?323	?3·26	?·506
	24-9-„	6	0	8	99	1·43	5·06	·69	·30	·27	·00	·0	..	0	NW	5	R	837·1	1·65	3·26	·00	NW	5	..	0	1·79	·922	·27	..	0	160	2·29	·721
	δ Range,	3	0	0	10	·66	·06	·01	·00	·01	..	·0	..	..	..	..	..	5·6	·00	?	..	..	..	..	..	?	?	·01	..	..	?163	?·03	?·215
	v Means of 2,	4½	0	8	104	1·76	5·03	·70	·30	3·28	..	150·0	E & N 6				..	839·9	1·65	?3·26	..	? NW 3				?1·79	?·922	3·28	E 4		?242	?2·78	?·613
177.	27-9-76	0	0	0	0	?	4·94	1·01	1·35	3·70	−·04	150·0	..	0	E	10	H	866·5	1·50	3·72	+·01	..	0	..	0	1·61	·932	3·73	..	0	200	2·73	·549
	29-9-„	0	0	0	0	?	5·03	1·17	1·03	·61	+·10	·0	NE	4	NE	4	H	851·3	1·51	·57	·00	E	*l*	NE	4	1·54	·981	·57	E	*l*	195	2·64	·572
	28-9-„	0	0	0	0	?	5·05	1·00	1·13	·55	−·03	·0	E	12	E	27	W	788·8	1·42	·57	·00	..	0	..	0	1·50	·947	·57	..	0	185	2·57	·553
	δ Range,	0	0	0	0	?	·11	·17	·32	·15	..	·0	..	..	..	..	..	77·7	·09	·15	..	..	..	..	..	·11	·049	·16	..	..	015	·16	·023
	v Means of 3,	0	0	0	0	?	5·01	1·06	1·17	3·62	..	150·0	E & N 9				..	835·5	1·48	3·62	..	NE 1				1·55	·953	3·62	E *l*		193	2·65	·558
179	3-10-76	0	0	0	0	?	5·18	1·02	·90	3·11	·00	150·0	..	0	..	0	H	583·7	1·21	3·11	·00	..	0	..	0	1·26	·961	3·11	..	0	180	2·37	·511
180	19-9-78	0	0	9	17	1·24	5·54	·56	·10	2·28	+·08	150·0	..	0	..	0	P	315·0	·90	2·24	−·01	..	0	..	0	·98	·918	2·25	..	0	150	1·84	·489
	18-9-„	0	0	9	21	1·24	5·89	·21	·10	·24	·00	·0	NW	*l*	..	0	R	286·7	·84	·24	·00	..	0	E	*l*	·83	1·012	·24	NW	*l*	145	1·80	·467
	δ Range,	0	0	0	4	·00	·35	·35	·00	·04	..	·0	..	..	..	..	..	28·3	·06	·00	..	..	..	..	..	·15	·094	·01	..	..	005	·04	·022
	v Means of 2,	0	0	9	19	1·24	5·72	·39	·10	2·26	..	150·0	NW *l*				..	300·9	·87	2·24	..	E *l*				·91	·965	2·25	NW *l*		148	1·82	·478
181	12-7-78	13	0	10	0	·67	7·58	·59	?·06	1·69	+·07	150·0	..	0	S	11	R	114·1	·44	No Observations.								1·73	S	11	090	1·25	·352

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

TABLE LXV.

Fifteenth Mile Old Site.

Serial No.	1	2								3												4								5					
		Control.					Fall of Water-Surface.			Rod-Velocity Results.												Central Surface-Velocity Results.								Surface-Slope Results.					
		Headworks Dhanauri.		Tail Asafnagar.									Wind.											Wind.								Wind.				
													From		To									From		To									
	Date, 1878.	Gates open in Dam.	Ogees open in Dam.	Gates closed in Regulator.	Withdrawn by Distributaries.	Average Obstruction.	Upper 2 miles.	3 miles below Site	Lower 4½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	Direction.	Velocity.	Direction.	Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Hyd. Mean Depth.	Variation of water-level.	Direction.	Velocity.	Direction.	Velocity.	Central Surface Velocity [Mean of 48 trials]	Ratio $V \div v_o$	Hyd. Mean Depth.	Direction.	Velocity.	Surface-Slope. [Left Bank.]	Value of $100\sqrt{RS}$	Ratio $V \div w$.
		Q	k				F_1	F_2	F_3	R		b						D	V	R						v_o	c	R			S	w	C
191	29-5-78	0	0	0	123	·00	2·28	3·63	5·54	9·49	+·02	174·9	NW	*l*	NE	3	T	7,187	4·16	9·48	·00	NW	*l*	NW	*l*	4·91	·847	9·51	NW	*l*	240	4·77	·872
192.	24-4-78	0	0	0	0	·00	2·24	3·66	4·87	8·67	−·01	174·9	N	3	..	0	T	5,890	3·77	8·66	·00	N	3	N	*l*	4·60	·820	8·67	N	3	238	4·54	·830
	23-4- „	0	0	0	0	·00	2·25	3·65	4·87	·66	−·01	·9	..	0	..	0	R	6,492	4·16	·66	·00	..	0	..	0	4·58	·908	·66	..	0	228	4·44	·937
	10-4- „	0	0	0	115	·00	2·26	3·64	4·90	·65	−·01	·9	..	0	..	0	T	6,226	4·00	·64	·00	..	0	..	0	4·71	·849	·65	..	0	253	4·67	·857
	29-4- „	0	0	0	50	·00	2·26	3·64	4·87	·65	−·02	·9	..	0	..	0	R	6,223	4·00	·65	·00	..	0	..	0	4·57	·875	·66	..	0	223	4·39	·911
	30-4- „	0	0	0	50	·00	2·29	3·61	4·90	·62	+·02	·9	..	0	..	0	T	6,154	3·96	·62	·00	..	0	..	0	4·54	·872	·63	..	0	220	4·35	·910
	1-5- „	0	0	0	50	·00	2·26	3·69	4·80	·61	−·01	·9	..	0	..	0	R	6,209	4·01	·60	·00	N	3	..	0	4·61	·870	·61	..	0	225	4·40	·911
	δ Range,	0	0	0	115	·00	·05	·08	·10	·06	..	·0	..	..	..	..	..	602	·39	·06	..	..	..	..	..	·17	·088	·06	..	..	033	·32	·107
	v Means of 6,	0	0	0	44	·00	2·26	3·65	4·87	8·64	..	174·9	N	*l*			..	6,199	3·98	8·64	..	N	1			4·60	·866	8·65	N	1	231	4·47	·893
193.	8-4-78	0	0	0	126	·00	2·26	3·64	4·75	8·39	+·12	174·9	..	0	..	0	R	5,851	3·89	8·40	+·03	..	0	..	0	4·57	·851	8·34	..	0	228	4·37	·890
	4-4- „	0	0	0	113	·00	2·31	3·59	4·75	·35	·00	·9	..	0	..	0	T	5,771	3·86	·35	·00	..	0	..	0	4·44	·869	·35	..	0	223	4·33	·891
	29-3- „	0	0	0	0	·00	2·34	3·56	4·70	·32	·00	·9	N	8	NW	7	R	5,737	3·85	·32	·00	S	9	V	*b*	4·53	·850	·32	N	8	230	4·38	·879
	δ Range,	0	0	0	126	·00	·08	·08	·05	·07	..	·0	..	..	..	..	..	114	·04	·08	..	..	..	..	..	·13	·19	·03	..	..	007	·05	·012
	v Means of 3,	0	0	0	80	·00	2·30	3·60	4·73	8·35	..	174·9	NNW	2			..	5,786	3·87	8·36	..	S	2			4·51	·857	8·34	N	3	227	4·36	·887
194	15-4-78	0	0	0	0	·00	2·27	3·63	4·55	8·12	−·03	174·9	SW	4	..	0	R	5,711	3·93	8·12	−·01	..	0	..	0	4·55	·864	8·13	SW	4	228	4·31	·912
	16-4- „	0	0	0	0	·00	2·26	3·69	4·25	7·91	+·01	·9	..	0	..	0	T	5,532	3·92	7·90	·00	..	0	..	0	4·66	·878	7·90	..	0	233	4·30	·912
	δ Range,	0	0	0	0	·00	·01	·06	·30	·21	..	·0	..	..	..	..	..	179	·01	·22	..	..	..	..	..	·11	·014	·23	..	..	005	·01	·000
	v Means of 2,	0	0	0	0	·00	2·27	3·66	4·40	8·02	..	174·9	SW	1			..	5,622	3·93	8·01	..	Calm.				4·61	·871	8·02	SW	2	231	4·31	·912
195	25-5-78	0	0	0	62	·00	2·06	3·79	3·65	7·13	+·15	171·3	..	0	N	*l*	T	4,370	3·51	7·15	·00	..	0	..	0	4·21	·834	No Observations.					

Digitized by Google

Fifteenth Mile New Site.

[The Surface-Slope (S) is the mean of measurements on both banks (given in Table XLIX.); the state of the Wind is given for each].

Serial No.	1	2								3										4							5					
		Control.					Fall of Water-Surface			Rod-Velocity Results.										Central Surface-Velocity Results.							Surface-Slope Results.					
		Headworks Dhanauri.		Tail Asafnagar.									Wind.								Wind.							Wind.					
	Date, 1878-79.	Gates open in Dam.	Ogees open in Dam.	Gates closed in Regulator.	Withdrawn by Distributaries.	Average Obstruction.	Upper 2 miles.	3 miles below Site.	Lower 4½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	From Direction.	From Velocity.	To Direction.	To Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Hyd. Mean Depth.	Variation of water-level.	From Direction.	From Velocity.	To Direction.	To Velocity.	Central Surface Velocity [Mean of 48 trials]	Ratio $V \div v_o$	Hyd. Mean Depth.	Wind. Direction.	Wind. Velocity.	Surface-Slope. [Both Banks].	Value of $100 \sqrt{RS}$	Ratio $V \div w$.
					Q	h	F_1	F_2	F_3	R		b						D	V	R						v_o	c	R			s	w	C
196.	18-12-78	0	0	0	268	·00	2·28	3·69	5·43	8·71	−·03	186·0	W	3	..	0	R	6,921	4·14	8·68	·00	NW	4	..	0	4·69	·883	8·72	W 3 .. 0		?215	?4·33	?·956
	19-12- „	0	0	0	268	·00	2·21	3·64	5·45	·68	+·01	185·9	..	0	V	l	S	6,844	4·11	·68	·00	V	l	..	0	4·61	·892	·68	.. 0 V l		226	4·43	·928
	20-12- „	0	0	0	268	·00	2·28	3·62	5·23	·63	·00	·7	..	0	V	l	R	6,806	4·12	·64	−·01	S	9	W	6	4·77	·864	·63	.. 0 V l		222	4·38	·941
δ	Range,	0	0	0	0	·00	·07	·07	·22	·08	..	·3	..	..	..	..	..	115	·03	·04	..	..	..	..	..	·16	·028	·09	.. ..		?011	?·10	?·028
v	Means of 3,	0	0	0	268	·00	2·26	3·65	5·37	8·67	..	185·9	W 1				..	6,857	4·12	8·67	..	SW 1				4·69	·880	8·68	W 1		?221	?4·38	?·942
197	15-4-79	0	0	?	115	·00	2·19	3·66	5·20	8·35	+·10	184·2	V	l	SW	14	S	6,287	3·98	8·37	+·02	V	l	SW	13	4·52	·881	8·35	V l SW 14		220	4·29	·928

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

TABLE LXVI.

Belba Site.

[The Surface-Slope (S) is the mean of measurements on both banks (given in Tables L., LI.); the state of the Wind is given for each].

Serial No.	1	2				3									4					5							6
		Control.		Fall of Water-Surface.		Rod-Velocity Results.									Central Surface-Velocity Results.						Surface-Slope Results.							Silt in grains per cub. ft.
	Date, 1879.	Withdrawn by Distributaries.	Tail of Reach. Average Obstruction.	Upper 1 mile.	Lower 4 miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	Wind. From Direction.	Wind. From Velocity.	Wind. To Direction.	Wind. To Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Hyd. Mean Depth.	Variation of water-level.	Wind. From Direction.	Wind. From Velocity.	Wind. To Direction.	Wind. To Velocity.	Central Surface Velocity. [Mean of 48 trials].	Ratio $V \div v_o$.	Hyd. Mean Depth.	Wind. 1st Slope. Direction.	Wind. 1st Slope. Velocity.	Wind. 2nd Slope. Direction.	Wind. 2nd Slope. Velocity.	Surface-Slope (Both Banks).	Value of $100\sqrt{RS}$	Ratio $V \div v$.	
		Q	k	F_1	F_2	R		b						D	V	R					v_o	C	R					s	v	C	q
201.	27-3	27	·00	·72	4·05	9·19	− ·07	188·5	..	0	..	0	A	5,432	3·00	9·18	− ·03	..	0	..	0	3·59	·836	9·19	..	0	..	0	180	4·07	·737	86
	9-1	243	·00	?	?	·03	·00	·5	..	0	..	0	A	5,751	3·24	..	..	..	..	..	..	?	?	·03	..	0	..	0	200	4·25	·762	71
	11-1	257	·00	?	?	8·98	+ ·03	·4	S	8	..	0	A	5,765	3·27	9·00	+ ·01	S	1	..	0	3·68	·889	8·98	S	8	..	0	203	4·27	·766	93
	10-1	257	·00	?	?	·98	− ·02	·4	S	6	..	0	P	5,739	3·26	8·97	·00	S	5	..	0	3·73	·874	·98	S	6	..	0	193	4·16	·784	?
	17-3	62	·00	·67	3·90	·93	− ·02	·3	N	1	N	1	P	5,367	3·06	·94	·00	N	1	N	1	3·66	·836	·93	N	1	N	1	178	3·99	·767	1025
δ Range.		230	·00	?·05	?·15	·26	..	·2	..	..	..	..	..	398	·27	?·24	..	..	..	..	..	?·14	?·053	·26	..	..	..	..	025	·28	·047	?954
v Means of 5.		169	·00	?·70	?3·98	9·02	..	188·4	S 1				..	5,611	3·17	?9·02	..	? S 1				?3·67	?·859	9·02	S 1				191	4·15	·763	?319
Series 202.	21-1	209	·00	?	?	8·75	·00	188·0	..	0	..	0	P	5,864	3·13	8·77	·00	..	0	..	0	3·71	·844	8·75	..	0	..	0	205	4·24	·738	668
	22-1	221	·00	?	?	·74	+ ·02	·0	N	3	NW	4	A	5,309	3·11	·75	·00	N	9	N	9	3·59	·866	·74	N	3	NW	4	205	4·23	·735	63
	23-1	221	·00	?	?	·68	·00	187·9	..	0	..	0	P	5,301	3·13	·69	·00	..	0	W	9	3·79	·826	·68	..	0	N ½ W	11	208	4·25	·736	129
	„	„	„	?	?	·71	·00	188·0	NW	11	NNW	5	A	5,425	3·19	„	„	„	„	„	„	„	·842	·71	„	„	„	„	„	4·26	·749	„
	18-3	143	·00	·66	3·81	·86	·00	·2	..	0	..	0	A	5,324	3·06	·86	·00	..	0	..	0	3·68	·832	·86	..	0	..	0	180	3·99	·767	73
	24-2	0	·00	·98	3·59	·68	− ·05	·0	..	0	S	1	P	5,149	3·03	·68	·00	..	0	S	1	3·53	·858	·68	..	0	S	1	183	3·99	·759	161
	17-1	298	·00	?	?	·63	+ ·03	·0	N	7	NW	3	A	5,431	3·22	·66	+ ·03	NW	3	NW	3	3·78	·852	·63	N	7	NW	3	210	4·26	·756	2981
δ Range.		298	·00	?·32	?·22	·23	..	·3	..	..	..	..	..	282	·19	·20	..	..	..	..	..	·26	·040	·23	..	..	..	..	030	·27	·032	2918
v Means of 7.		188	·00	?·82	?3·70	8·72	..	188·0	NNW 2				..	5,329	3·12	8·73	..	NW 3				3·70	·846	8·72	N ½ W 3				200	4·17	·749	600

Digitized by Google

Series 203.	25-3	38	·00	0·76	3·61	8·64	·00	187·9	..	0	S	11	P	5,193	3·07	8·64	·00	S	*l*	S	8	3·33	·922	8·64	..	0	S	11	168	3·81	·806	81
	20-3	150	·00	0·60	3·67	·56	−·08	·9	..	0	..	0	P	5,174	3·09	·55	−·02	..	0	..	0	3·43	·901	·56	..	0	..	0	188	4·01	·771	124
	25-1	284	·00	?	?	·52	·00	·6	N	*l*	..	0	P	5,311	3·20	·53	·00	..	0	N	*l*	3·60	·889	·52	N	*l*	..	0	218	4·31	·742	108
	25-2	0	·00	1·17	3·40	·52	−·02	·8	..	0	N	*l*	A	5,089	3·06	·51	−·01	N	*l*	N	*l*	3·64	·841	·52	..	0	N	*l*	185	3·97	·771	1029
	„	„	„	1·21	3·36	·48	−·01	·7	N	*l*	N	7	P	4,984	3·01	„	„	„	„	„	„	„	·827	·48	„	„	„	„	„	3·96	·760	„
	16-1	298	·00	?	?	·42	+·07	·8	S	5	..	0	P	5,259	3·20	·43	·00	S	8	..	0	3·57	·896	·42	S	5	..	0	200	4·10	·780	342
	15-3	93	·00	1·03	3·64	·41	+·14	·8	..	0	N	*l*	P	5,109	3·11	·44	+·05	..	0	..	0	3·68	·845	·41	..	0	N	*l*	188	3·98	·781	90
	14-3	134	·00	0·58	3·39	·37	−·13	·8	..	0	..	0	A	4,753	2·91	..	..	..	..	..	..	?	?	·37	..	0	..	0	?175	?3·83	?·760	986
	27-1	280	·00	0·96	3·51	·31	·00	·7	S	*l*	..	0	A	5,142	3·17	·30	+·02	..	0	..	0	3·57	·888	·31	S	*l*	..	0	205	4·13	·768	138
δ	Range,	298	·00	?·63	?·31	·33	..	·3	..	..	..	..	..	558	·29	?·34	..	..	..	..	..	?·35	?·095	·33	..	..	..	..	?050	?·50	?·064	948
v	Means of 9,	142	·00	?·90	?3·51	8·47	..	187·8	S 1				..	5,112	3·09	?8·49	..	? S 1				?3·56	?·876	8·47	S 1				?191	?4·01	?·771	436
Series 204.	21-3	140	·00	0·73	3·34	8·28	−·02	187·5	..	0	..	0	P	4,815	2·98	8·27	·00	..	0	..	0	3·35	·890	8·28	..	0	..	0	180	3·86	·772	55
	13-3	171	·00	1·19	3·58	·27	+·26	·7	S	*l*	..	0	P	4,900	3·03	..	..	..	..	..	..	?	?	·27	S	*l*	..	0	203	4·10	·740	134
	27-2	0	·00	0·75	3·22	·28	−·05	·5	..	0	..	0	A	4,762	2·96	8·25	−·01	..	0	..	0	3·44	·860	·28	..	0	..	0	188	3·95	·749	144
	„	„	„	0·77	3·20	·26	−·03	·5	..	0	N	*l*	P	4,796	2·99	„	„	„	„	„	„	„	·869	·26	„	„	„	„	„	3·94	·759	„
	22-3	150	·00	0·75	3·32	·26	−·01	·5	..	0	..	0	A	4,781	2·97	·25	·00	..	0	..	0	3·35	·887	·26	..	0	..	0	188	3·94	·754	666
	24-3	51	·00	0·71	3·36	·25	−·01	·4	..	0	..	0	P	4,725	2·94	·23	·00	..	0	..	0	3·38	·870	·25	..	0	..	0	185	3·91	·752	298
	18-2	117	·19	0·63	3·11	·24	−·01	·5	N	*l*	..	0	P	4,941	3·08	·23	·00	..	0	N	*l*	3·46	·890	·24	N	*l*	..	0	195	4·01	·768	859
	28-2	0	·00	0·53	3·24	·21	−·02	·4	..	0	N	*l*	A	4,786	3·00	·21	·00	N	*l*	N	*l*	3·37	·890	·21	..	0	N	*l*	255	4·58	·655	84
	17-2	127	·28	0·36	3·11	·21	+·04	·5	N	*l*	N	*l*	A	4,718	2·95	·22	+·01	N	*l*	N	*l*	3·58	·824	·21	N	*l*	N	*l*	205	4·10	·720	98
	20-2	155	·28	1·07	3·10	·20	−·01	·5	..	0	..	0	A	4,777	2·99	·19	·00	..	0	..	0	3·61	·828	·20	..	0	..	0	193	3·98	·751	105
	21-2	153	·28	0·84	3·03	·14	·00	·4	..	0	N	*l*	P	4,769	3·01	·12	·00	..	0	..	0	3·50	·860	·14	..	0	N	*l*	190	3·93	·766	293
	22-2	174	·28	0·95	3·02	·18	·00	·4	..	0	..	0	A	4,880	3·05	·13	·00	N	*l*	N	*l*	3·51	·869	·18	..	0	..	0	190	3·93	·776	59
	6-2	217	·00	0·75	3·32	·11	·00	·4	..	0	N	*l*	A	4,801	3·04	·11	·00	..	0	N	*l*	3·62	·840	·11	..	0	N	*l*	208	4·06	·749	60
	28-1	280	·00	1·02	3·25	·08	+·04	·4	..	0	..	0	P	4,984	3·14	·09	·00	..	0	..	0	3·47	·905	·08	..	0	..	0	215	4·17	·758	1358
δ	Range,	280	·09	·83	·56	·20	..	·3	..	..	..	..	..	223	·20	?·18	..	..	..	..	..	?·27	?·081	·20	..	..	..	..	075	·72	·121	1203
v	Means of 14,	124	·09	·79	3·23	8·21	..	187·5	N *l*				..	4,810	3·01	?8·20	..	? N *l*				?3·47	?·868	8·21	N *l*				198	4·03	·747	304
Series 205.	7-2	257	·00	0·79	3·28	8·08	−·02	187·4	..	0	N	*l*	P	4,791	3·05	8·08	−·02	..	0	..	0	3·60	·847	8·08	..	0	N	*l*	208	4·05	·753	241
	8-2	247	·00	0·94	3·23	·03	·00	·3	N	*l*	..	0	A	4,826	3·09	·03	·00	..	0	..	0	3·57	·866	·03	N	*l*	..	0	200	4·01	·771	96
	30-1	263	·00	1·03	3·19	7·99	·00	·3	..	0	..	0	A	4,745	3·06	7·99	·00	..	0	..	0	3·53	·867	7·99	..	0	..	0	218	4·17	·734	66
	10-2	247	·47	0·84	2·88	·96	·00	·3	..	0	..	0	P	4,724	3·05	·96	·00	..	0	..	0	3·44	·887	·96	..	0	..	0	200	3·99	·764	108
	31-1	255	·00	0·95	3·12	·88	·00	·2	NNW	7	NW	5	P	4,718	3·08	·88	·00	NW	6	N	9	3·58	·860	·88	NNW	7	N	5	220	4·16	·740	139
	4-2	255	·00	0·68	3·19	·80	·00	·3	..	0	..	0	P	4,791	3·08	·80	·00	..	0	..	0	3·46	·890	·80	..	0	..	0	208	4·03	·764	561
δ	Range,	16	·47	·35	·40	·28	..	·2	..	..	..	..	..	108	·04	·28	..	..	..	..	..	·16	·043	·28	..	..	..	..	020	·18	·037	495
v	Means of 6,	254	·08	·87	3·15	7·96	..	187·3	NW ♭ N 1				..	4,766	3·07	7·96	..	NNW 1				3·53	·870	7·96	NW ♭ N 1				208	4·07	·754	202

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

TABLE LXVII.

Belra Site.

[The Upper Sub-Reach is about 1 mile long, and the Lower about 4 miles].

[The Surface-Slope (S) is the mean of measurements on both banks (given in Tables L., LI.) ; the state of the Wind is given for each].

Serial No.	Date, 1879.	2 Control. Fall of Water-Surface.				3 Rod-Velocity Results.									4 Central Surface-Velocity Results.						5 Surface-Slope Results.								6
		Tail of Reach.							Wind.								Wind.						Wind.						
		Withdrawn by Distributaries.	Average Obstruction.	Upper Sub-Reach.	Lower Sub-Reach	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	From Direction.	From Velocity.	To Direction.	To Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Hyd. Mean Depth.	Variation of water-level.	From Direction.	From Velocity.	To Direction.	To Velocity.	Central Surface Velocity [Mean of 48 trials].	Ratio $V \div v_o$.	Hyd. Mean Depth.	1st Slope Direction.	1st Slope Velocity.	2nd Slope Direction.	2nd Slope Velocity.	Surface Slope. [Both Banks]	Value of $100\sqrt{RS}$	Ratio $V \div w$.	Silt in grains per cub. ft.
		Q	k	F_1	F_3	R		b						D	V	R						v_o	c	R					S	w	C	σ
Series 206.	3-2	255	·00	0·84	2·88	7·77	·00	187·0	..	0	..	0	A	4,582	3·04	7·77	·00	..	0	..	0	3·43	·886	7·77	..	0	..	0	218	4·12	·738	99
	7-3	147	·00	0·72	3·05	·70	−·03	186·9	..	0	..	0	P	4,284	2·87	·71	+·01	..	0	..	0	3·28	·875	·70	..	0	..	0	210	4·02	·714	138
	8-3	147	·00	0·74	2·83	·69	·00	·9	..	0	..	0	A	4,288	2·88	·68	·00	..	0	..	0	3·29	·875	·69	..	0	..	0	198	3·90	·738	5233
	6-3	198	·00	0·75	3·02	·68	·00	·9	N	*l*	..	0	A	4,330	2·91	·68	·00	..	0	..	0	3·47	·839	·68	N	*l*	..	0	208	4·00	·725	58
	3-3	156	·00	0·85	2·87	·63	+·02	·9	N	6	N	5	C	4,121	2·79	·64	·00	N	5	N & W	7	3·26	·856	·63	N	6	N	5	196	3·87	·721	81
	11-2	247	·56	1·03	2·49	·62	−·05	·9	..	0	..	0	P	4,415	3·00	·61	+·03	..	0	..	0	3·32	·904	·62	..	0	..	0	?198	?3·88	?·773	818
	4-3	151	·00	0·74	2·93	·60	·00	·8	V	*l*	N	*l*	P	4,361	2·97	·52	−·02	NW	8	NW	4	3·47	·856	·60	N	*l*	N	*l*	208	3·98	·746	127
	13-2	217	·56	0·84	2·43	·57	·00	·8	..	0	N	*l*	A	4,481	3·06	·57	·00	N	*l*	..	0	3·52	·869	·57	..	0	N	*l*	?193	?3·82	?·801	99
	14-2	191	·56	0·82	2·35	·50	·00	·7	..	0	..	0	A	4,248	2·94	·50	·00	..	0	..	0	3·38	·870	·50	..	0	..	0	?195	?3·82	?·770	171
	15-2	191	·56	0·74	2·35	·48	·00	·7	E	5	..	0	P	4,160	2·88	·48	·00	SE	8	..	0	3·37	·855	·48	E	5	..	0	?193	?3·80	?·758	219
	11-3	147	.00	0·69	2·86	·47	−·05	·7	..	0	N	19	A	4,166	2·89	·46	−·02	..	0	N	*l*	3·48	·830	·47	..	0	N	19	198	3·85	·751	48
	10-3	147	·00	0·72	2·85	·46	−·02	·7	..	0	..	0	P	4,064	2·82	·46	−·02	N	*l*	..	0	3·40	·829	·46	..	0	..	0	188	3·75	·752	123
	δ Range,	108	·56	·34	·70	·31	..	·3	..	..	..	..	..	518	·27	·31	..	..	..	..	..	·26	·075	·31	..	..	..	..	?030	?·37	?·087	5185
	μ Means of 12,	183	·19	·79	2·74	7·60	..	186·8	N & E 1				..	4,292	2·92	7·59	..	N & W 1				3·39	·862	7·60	N & E 1				?200	?3·90	?·749	601

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

Jaolí Site.

[The Upper Sub-Reach is about ¾ mile long, and the Lower about 5 miles.]

[The Surface-Slope (S) is the mean of measurements on both banks (given in Tables LII, LIII); the state of the Wind is given for each].

Series 211	9-1	59	·00	·36	5·58	7·86	+·01	192·8	V	*l*	V	*l*	S	4,813	3·06	7·86	·00	V	*l*	..	0	3·48	·879	7·86	V	*l*	V	*l*	?178	?3·74	?·818	No Observations.
	7-1	59	?·00	·36	?	·86	−·05	·8	V	*g*	..	0	S	4,671	2·97	·88	·00	SW	4	S	5	3·47	·856	·86	W	3	..	0	178	3·74	·794	
	„	59	?·00	·36	?	·86	−·02	·8	W	3	V	*l*	R	4,634	2·93	·85	·00	SW	6	V	*l*	3·46	·847	·86	„	„	„	„	„	3·74	·783	
	8-1	59	?·00	·35	?	·83	·00	·8	N	4	V	*l*	R	4,660	2·97	·83	·00	N	7	W	3	3·55	·837	·83	N	4	V	*l*	183	3·79	·784	
	17-3	44	·00	·32	5·42	·82	−·04	·6	NW	10	W	20	R	4,493	2·87	·79	−·02	W	17	NW	8	3·38	·849	·82	NW	10	W	20	151	3·44	·834	
	27-3	0	·00	·55	5·57	·97	−·12	·9	..	0	..	0	S	4,754	2·97	8·00	−·02	..	0	V	*l*	3·44	·863	·97	..	0	..	0	165	3·63	·818	
	10-1	59	·00	·38	5·46	·75	·00	·7	N	6	NE	7	R	4,643	2·99	7·75	+·01	N	8	N	2	3·46	·864	·75	N	6	NE	7	179	3·72	·804	
	11-1	59	·00	·40	5·44	·73	+·02	·7	E	4	V	*l*	S	4,590	2·97	·73	·00	N	4	E	5	3·30	·900	·73	E	4	V	*l*	176	3·69	·805	
	6-1	75	?·00	·39	?	·70	·00	·7	S	5	W	3	S	4,416	2·87	·70	·00	S	3	V	*l*	3·37	·852	·70	S	5	W	3	180	3·70	·776	
	δ Range,	75	?·00	·23	?·16	·27	..	·3	..	..	..	..	..	397	·19	·30	..	..	..	..	..	·25	·063	·27	..	..	..	..	?032	?·35	?·058	
	v Means of 9,	53	?·00	·39	?5·49	7·82	..	192·8	NW *b* W 2				..	4,631	2·96	7·82	..	WNW 2				3·43	·861	7·82	NW *b* W 2				?174	?3·69	?·802	
Series 212.	18-3	90	·00	·33	5·21	7·64	−·04	192·4	W	*l*	SW	9	R	4,384	2·88	7·60	−·02	S	8	W	10	3·16	·911	7·64	W	*l*	SW	9	151	3·40	·847	No Observations.
	24-2	0	·00	·33	5·19	·51	−·08	·3	..	0	S	13	S	4,330	2·90	·51	·00	..	0	..	0	3·30	·879	·51	..	0	S	13	148	3·33	·871	
	21-1	53	·00	·33	5·11	·46	−·04	·3	..	0	S	4	S	4,478	3·01	·48	·00	S	*l*	S	*l*	3·28	·918	·46	..	0	S	4	170	3·56	·846	
	22-1	53	·00	·31	5·13	·39	−·02	·2	NW	7	W	17	R	4,488	3·05	·41	−·02	W	17	NW	17	3·40	·897	·39	NW	7	W	17	171	3·55	·859	
	25-2	0	·00	·27	5·10	·38	·00	·2	..	0	N	8	R	4,135	2·82	·38	·00	N	8	N	7	3·40	·830	·38	..	0	NW	6	145	3·27	·862	
	23-1	59	·00	·33	5·09	·36	·00	·2	NW	4	W	25	S	4,328	2·95	·36	·00	W	6	W	14	3·36	·878	·36	NW	4	W	25	171	3·55	·831	
	δ Range,	90	·00	·06	·12	·28	..	·2	..	..	..	..	..	353	·23	·24	..	..	..	..	..	·24	·088	·28	..	..	..	..	026	·29	·040	
	v Means of 6,	43	·00	·32	5·14	7·46	..	192·3	W *b* S 5				..	4,357	2·94	7·46	..	W *b* N 5				3·32	·886	7·46	W *b* S 5				160	3·44	·853	
Series 213.	15-3	44	·00	·29	4·95	7·40	+·20	192·1	SW	5	W	3	R	4,146	2·82	7·40	+·04	W	7	N	8	3·43	·822	7·40	SW	5	W	3	141	3·23	·873	No Observations.
	25-2	0	·00	·30	5·12	·36	−·02	·1	N	6	NW	6	S	4,199	2·87	·39	·00	N	8	N	7	3·40	·844	·36	..	0	NW	6	145	3·27	·878	
	25-3	100	·00	·31	5·08	·28	+·02	·1	E	17	E	17	S	4,209	2·91	·28	·00	E	20	E	17	3·25	·895	·28	E	17	E	17	154	3·35	·869	
	17-1	63	·00	·35	4·99	·19	−·02	·1	W	11	W	14	R	4,201	2·94	·20	·00	NW	8	W	7	3·40	·865	·19	W	11	W	14	?158	?3·37	?·872	
	18-2	80	1·00	·26	4·28	·17	·00	191·9	N	4	N	8	S	4,002	2·82	·17	·00	N	4	..	*l*	3·42	·825	·17	N	4	N	8	136	3·12	·904	
	17-2	20	1·00	·23	4·16	·15	+·02	·9	N	6	W	4	R	3,923	2·77	·15	+·04	S	3	W	6	3·33	·834	·15	N	6	W	4	141	3·18	·871	
	16-1	59	·00	·32	5·00	·02	−·04	·9	..	0	V	*l*	S	4,057	2·98	·02	−·02	..	0	V	*l*	3·27	·911	·02	..	0	V	*l*	165	3·40	·876	
	δ Range,	100	1·00	·12	·96	·38	..	·2	..	..	..	..	..	286	·21	·38	..	..	..	..	..	·18	·089	·38	..	..	..	..	?029	?·28	?·035	
	v Means of 7,	52	·29	·29	4·80	7·22	..	192·0	N *b* W 2				..	4,105	2·87	7·23	..	NNE ?				3·36	·857	7·22	N *b* W 1				?148	?3·27	?·878	

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES. TABLE LXVIII.

JAOLÍ SITE.

[The Surface-Slope (S) is the mean of measurements on both banks (given in Tables LII., LIII.); the state of the Wind is given for each].

Serial No.	1	2				3											4							5						
		CONTROL.		FALL of Water-Surface.		ROD-VELOCITY RESULTS.											CENTRAL SURFACE-VELOCITY RESULTS.							SURFACE-SLOPE RESULTS.						
		Tail of Reach.							WIND.								WIND.							WIND.						
		Withdrawn by Distributaries.	Average Obstruction.	Upper ½ mile.	Lower 5 miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	From		To		Time-keeper's Initial.	CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.	Hyd. Mean Depth.	Variation of water-level.	From		To		CENTRAL SURFACE VELOCITY. [Mean of 48 trials].	Ratio $V \div v_0$	1st Slope.		2nd Slope		Surface-Slope. [Both Banks]	Value of $100 \sqrt{RS}$	Ratio $V \div w$.
	DATE, 1879.	Q	k	F_1	F_2	R		b	Direction.	Velocity.	Direction.	Velocity.		D	V	R		Direction.	Velocity.	Direction.	Velocity.	v_0	e	R	Direction.	Velocity.	Direction.	Velocity.	S	s	C
Series 214.	20-3	80	·00	·28	4·94	7·14	−·06	191·8	W	8	W	11	S	3,983	2·82	7·11	+·02	W	7	W	8	3·17	·889	7·14	W	8	W	11	153	3·31	·852
	13-3	44	·00	·28	4·86	·06	+·32	·7	..	0	N	11	B	3,943	2·82	·05	+·12	..	0	..	0	3·31	·852	·06	..	0	N	11	159	3·35	·842
	27-2	0	·00	·24	4·28	·06	−·04	·8	W	10	NW	13	S	3,920	2·81	·05	+·02	W	25	W	11	3·39	·829	·06	W	10	NW	13	141	3·16	·889
	"	0	·00	·24	4·28	·06	·00	·8	W	10	NW	20	R	3,905	2·79	"	"	"	"	"	"	"	·823	·06	"	"	"	"	"	3·16	·883
	20-2	30	·00	·29	4·85	·05	·00	·8	NW	16	W	7	R	3,844	2·74	·05	·00	NW	6	W	14	3·25	·843	·05	NW	16	W	7	129	3·02	·907
	25-1	63	·00	·33	4·76	·02	·00	·8	W	6	W	12	R	4,024	2·89	·02	·00	NW	6	W	6	3·18	·909	·02	N	6	N	12	148	3·22	·898
	28-2	0	·00	·25	4·84	·02	−·04	·7	NW	10	W	33	R	3,840	2·77	·04	·00	SW	9	SW	7	3·22	·860	·02	NW	10	W	33	143	3·17	·874
	27-1	63	·00	·32	4·82	6·98	−·04	·7	E	6	E	5	S	3,970	2·87	6·98	−·04	E	9	E	8	3·28	·875	6·98	E	6	E	5	154	3·28	·875
	δ Range,	80	·00	·09	·66	·16	..	·1	..	..	..	..	..	184	·15	·13	..	..	..	..	..	·22	·086	·16	..	..	..	..	030	·33	·065
	v Means of 8,	35	·00	·28	4·70	7·05	..	191·8	WNW 9				..	3,929	2·81	7·04	..	W 7				3·27	·860	7·05	WNW 9				146	3·21	·878
Series 215.	21-3	90	·00	·27	4·70	6·92	−·06	191·6	W	8	W	14	S	3,701	2·70	6·90	−·02	W	13	W	17	3·17	·852	6·92	W	8	W	14	144	3·16	·854
	21-2	20	·00	·31	4·68	·90	−·06	·6	..	0	N	5	S	3,766	2·76	·90	·00	NW	l	N	7	3·32	·831	·90	..	0	N	5	135	3·05	·905
	24-3	90	·00	·25	4·89	·89	+·04	·6	W	20	W	29	S	3,923	2·88	·89	+·02	W	10	W	20	3·22	·894	·89	W	20	W	29	148	3·19	·903
	22-3	90	·00	·28	4·76	·89	+·02	·6	SW	8	SW	17	R	3,878	2·85	·89	+·02	SW	13	SW	13	3·09	·922	·89	SW	8	SW	17	148	3·19	·893
	22-2	0	·00	·28	4·66	·88	·00	·6	..	0	NW	1	R	3,758	2·76	·88	·00	NE	4	W	7	3·27	·844	·88	..	0	NW	1	129	2·98	·926
	28-1	63	·00	·24	4·58	·76	−·04	·5	..	0	SW	6	S	3,646	2·73	·76	·00	..	0	S	2	3·16	·864	·76	..	0	SW	6	145	3·13	·872
	8-2	0	1·00	·29	3·80	·76	·00	·4	SW	10	W	11	R	3,565	2·68	·76	·00	W	7	W	8	3·16	·848	·76	SW	10	W	11	135	3·02	·887
	15-1	59	·00	·18	4·61	·67	+·08	·5	S	7	V	l	R	3,787	2·95	·67	+·04	V	l	V	l	3·21	·919	·67	N	3	V	l	166	3·42	·868
	10-2	0	1·00	·23	3·99	·62	−·04	·4	..	0	N	3	S	3,617	2·77	·62	−·02	N	6	N	8	3·26	·850	·62	..	0	N	3	135	2·99	·926
	14-1	59	·00	·26	4·63	·60	+·05	·4	W	8	W	10	R	3,757	2·89	·61	+·02	NW	10	NW	5	3·28	·881	·60	W	8	W	10	161	3·26	·887
	δ Range,	90	1·00	·23	1·09	·32	..	·2	..	..	..	..	..	358	·27	·29	..	..	..	..	..	·23	·091	·32	..	..	..	..	037	·44	·072
	v Means of 10,	47	·20	·25	4·53	6·79	..	191·5	W δ S 7				..	3,740	2·80	6·79	..	W δ N 5				3·21	·871	6·79	W δ S 7				145	3·14	·892

Digitized by Google

Series 216.	6-2	95	1·00	·25	3·84	6·66	·00	191·3	·3	W	14	W	20	B	3,584	2·73	6·66	·00	W	19	W	14	3·03	·901	6·66	W	14	W	20	143	3·09	·883
	30-1	75	·00	·25	4·49	·59	·00		·3	..	0	W	6	B	3,687	2·84	·61	·00	W	2	SW	7	3·19	·890	·59	..	0	W	6	141	3·05	·931
	7-2	0	1·00	·24	3·75	·57	·00		·2	W	9	NW	10	S	3,325	2·57	·57	·00	W	20	SW	16	3·21	·801	·57	W	9	NW	10	141	3·04	·845
	4-2	95	1·00	·27	3·87	·55	·00		·2	N	8	S	4	S	3,372	2·62	·55	·00	..	0	S	7	3·15	·832	·55	N	3	S	4	136	2·98	·879
	7-3	0	·00	·20	4·39	·51	+·02		·1	..	0	NNW	5	S	3,491	2·72	·53	+·02	..	0	..	0	3·20	·850	·51	..	0	NNW	5	143	3·05	·892
	15-1	59	·00	·40	4·39	·48	+·06		·3	N	3	..	0	S	3,625	2·84	·47	·00	..	0	..	0	3·19	·890	·48	N	3	V	1	166	3·28	·866
	8-3	0	·00	·24	4·35	·48	+·10		·1	..	0	SW	8	B	3,366	2·64	·48	+·02	S	8	SW	7	3·07	·860	·48	..	0	SW	8	139	3·00	·880
	31-1	75	1·00	·29	4·35	·47	·00		·2	W	20	W	25	S	3,416	2·69	·47	·00	W	33	SW	29	3·04	·885	·47	W	20	W	25	146	3·07	·876
	6-3	0	·00	·27	4·32	·45	·00		·1	NW	11	W	10	B	3,394	2·68	·45	·00	W	10	W	7	3·14	·854	·45	NW	11	W	10	138	2·98	·899
δ Range,		95	1·00	·20	·74	·21	..		·2	..	..	..	..	..	362	·27	·21	..	..	..	..	..	·18	·100	·21	..	..	..	..	030	·30	·086
ν Means of 9,		44	·44	·27	4·19	6·53	..	191·2		W δ N 7				..	3,473	2·70	6·53	..	WSW 9				3·14	·863	6·53	W δ N 7				144	3·06	·883
Series 217.	3-2	95	1·00	·22	3·67	6·37	·00	191·0	·3	SW	11	SW	13	B	3,246	2·60	6·37	·00	SW	11	SW	8	3·02	·861	6·37	SW	11	SW	13	135	2·93	·887
	14-2	0	1·00	·20	3·54	·36	·00	190·9		V	1	N	3	B	3,294	2·64	·36	·00	V	1	V	1	3·18	·830	·36	V	1	N	3	135	2·93	·901
	4-8	0	·00	·18	4·26	·35	+·04	191·0		SW	6	W	25	B	3,292	2·64	·37	+·02	NW	25	NW	20	3·17	·838	·35	SW	6	W	25	146	3·05	·866
	11-2	0	1·00	·22	3·52	·34	−·06	190·9		E	4	SE	4	B	3,290	2·64	·34	+·02	..	0	S	6	3·12	·846	·34	E	4	SE	4	143	3·01	·877
	13-2	0	1·00	·23	3·49	·32	−·04		·9	W	14	W	25	S	3,233	2·61	·32	+·02	W	20	W	20	3·03	·861	·32	W	14	W	25	139	2·96	·882
	11-3	0	·00	·23	4·06	·20	·00		·8	E	11	SE	7	B	3,202	2·64	·20	·00	..	0	..	0	3·04	·868	·20	E	11	SE	7	138	2·93	·901
δ Range,		95	1·00	·05	·77	·17	..		·2	..	..	..	..	..	92	·04	·17	..	..	..	..	..	·16	·038	·17	..	..	..	..	011	·12	·035
ν Means of 6,		16	·67	·21	3·76	6·32	..	190·9		WSW 6				..	3,259	2·63	6·33	..	W δ N 7				3·09	·850	6·32	WSW 6				140	2·97	·886

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES.

TABLE LXIX.

KAMHERA SITE.

[The Surface-Slope (S) is the mean of measurements on both banks (given in Tables LIV, LV); the state of the Wind is given for each].

Serial No.	1	2				3										4						5						
		CONTROL.		FALL of Water-Surface.		ROD-VELOCITY RESULTS.										CENTRAL SURFACE-VELOCITY RESULTS.						SURFACE-SLOPE RESULTS.						
	DATE, 1879.	Tail of Reach. Withdrawn by Distributaries.	Average Obstruction.	Upper 2½ miles.	Lower 8½ miles.	Hyd. Mean Depth.	Variation of water-level.	Surface-Breadth.	WIND. From Direction.	WIND. From Velocity.	WIND. To Direction.	WIND. To Velocity.	Timekeeper's Initial.	CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.	Hyd. Mean Depth.	Variation of water-level.	WIND. From Direction.	WIND. From Velocity.	WIND. To Direction.	WIND. To Velocity.	CENTRAL SURFACE VELOCITY. [Mean of 48 trials].	Ratio $V \div v_o$.	Hyd. Mean Depth.	WIND. 1st Slope. Direction.	WIND. 1st Slope. Velocity.	WIND. 2nd Slope Direction.	WIND. 2nd Slope Velocity.	Surface-Slope. [Both Banks].	Value of $100\sqrt{RS}$	Ratio $V \div u$.
		Q	k	F_1	F_2	R		b						D	V	R						v_o	c	R					S	u	C
221.	6-2	102	1·26	2·82	11·89	4·91	+·03	65·6	NNW	18	NNW	18	cl	981·6	2·87	4·92	·00	NNW	18	NNW	16	3·54	·811	4·91	NNW	18	NNW	18	290	3·77	·761
	7-2	102	1·26	2·85	11·84	·87	·00	·5	N	13	N	8	c	967·1	2·85	·87	·00	N	7	N	10	3·51	·812	·87	N	13	N	8	297	3·80	·750
	4-2	102	1·26	2·79	11·78	·82	−·02	·4	..	0	V	l	c	948·0	2·83	·82	−·02	V	l	V	l	3·26	·868	·82	..	0	..	0	297	3·78	·749
	3-2	99	1·26	2·87	11·68	·74	−·02	·5	NNW	12	NW	7	cl	945·8	2·88	·75	·00	NNW	15	NW	8	3·28	·878	·74	NNW	12	NW	7	298	3·76	·766
	δ Range,	3	·00	·08	·21	·17	..	·2	..	..	..	..	..	35·8	·05	·17	..	..	..	..	..	·28	·067	·17	..	..	..	..	008	·04	·017
	v Means of 4.	101	1·26	2 83	11·80	4·84	..	65·5	NNW	9			..	960·6	2·86	4·84	..	NNW	9			3·40	·842	4·84	NNW	9			295	3·78	·757
Series 222.	20-3	80	1·26	2·82	11·69	4·76	−·01	66·3	N	11	N	11	cl	908·6	2·72	4·75	·00	N	7	NW	8	3·28	·830	4·76	N	11	N	11	267	3·57	·762
	31-1	98	1·26	2·93	11·65	·62	+·01	65·4	NNW	10	N	23	c	921·4	2·89	·62	·00	NNW	11	N	16	3·52	·821	·62	NNW	19	N	28	287	3·64	·794
	30-1	98	1·26	2·98	11·61	·58	·00	·3	..	0	NW	9	cl	899·6	2·85	·58	·00	V	l	NW	11	3·32	·859	·58	..	0	NW	9	289	3·64	·788
	27-1	98	1·26	2·89	11·58	·57	·00	·3	V	l	..	0	cl	896·6	2·85	·57	·00	..	0	..	0	3·33	·856	·57	V	l	..	0	282	3·59	·794
	28-1	98	1·26	3·01	11·58	·55	·00	·3	..	0	V	l	c	877·0	2·80	·55	·00	V	l	V	l	3·17	·884	·55	..	0	V	l	298	3·68	·761
	25-1	98	1·26	2·92	11·54	·54	·00	·4	NNW	9	NNW	10	c	879·8	2·82	·54	·00	NNW	9	NW	13	3·48	·810	·54	NNW	9	NNW	10	284	3·59	·786
	4-1	92	1·26	3·00	11·49	·47	·00	·0	..	0	..	0	c	863·7	2·82	·47	·00	..	0	V	l	3·26	·865	·47	..	0	V	l	297	3·64	·775
	„	„	„	3·02	11·48	·46	·00	·0	„	„	V	l	c	862·7	2·83	„	„	„	„	„	„	„	·868	·46	„	„	„	„	„	3·64	·778
	3-1	92	1·26	3·01	11·48	·46	·00	·0	NNW	7	NNW	11	cl	898·7	2·94	·46	−·01	NNW	11	NW	3	3·44	·855	·46	NNW	7	NNW	11	302	3·67	·801
	9-1	94	1·26	2·94	11·50	·44	−·02	64·9	..	0	..	0	cl	830·5	2·74	·43	·00	..	0	..	0	3·21	·854	·44	..	0	..	0	299	3·64	·753
	10-1	94	1·26	2·95	11·48	·43	−·01	·9	V	l	V	l	c	824·6	2·73	·43	·00	V	l	V	l	3·12	·875	·43	V	l	V	l	308	3·69	·740
	15-1	90	1·26	3·03	11·56	·42	·00	65·0	..	0	..	0	cl	834·8	2·77	·42	·00	..	0	..	0	3·22	·860	·42	..	0	..	0	297	3·62	·765
	„	„	„	3·12	11·57	·42	+·02	·1	..	0	V	l	c	845·0	2·79	„	„	„	„	„	„	„	·866	·42	„	„	„	„	„	3·62	·770
	17-1	88	1·26	2·97	11·47	·42	−·02	·1	N	10	N	18	cl	862·6	2·85	·41	·00	N	18	N	19	3·52	·810	·42	N	10	N	21	282	3·53	·808
	„	„	„	2·98	11·46	·42	·00	·0	N	19	N	21	c	859·2	2·85	„	„	„	„	„	„	„	·810	·42	„	„	„	„	„	3·53	·808
	δ Range,	18	·00	·30	·23	·34	..	1·4	..	..	..	..	..	96·8	·22	·34	..	..	..	..	..	·40	·074	·34	..	..	..	..	041	·16	·068
	v Means of 15	93	1·26	2·97	11·54	4·50	..	65·2	N	b W	6		..	871·0	2·82	4·50	..	N	b W	5		3·32	·848	4·50	N	b W	6		291	3·62	·779

Digitized by Google

Series 223.	22-3	75	1·26	2·60	11·38	4·52	·00	65·5	NW 12	NW 11	cl	862·5	2·77	4·52	·00	NW 14	NW 11	3·34	·830	4·52	NW 12	NW 11	284	3·58	·774
	21-3	75	1·26	2·99	11·45	·52	·00	·5	N 13	N 13	c	838·4	2·69	·52	·00	NNW 12	NNW 12	3·28	·820	·52	N 13	N 13	288	3·61	·743
	25-3	90	1·26	2·68	10·71	·40	−·01	64·8	E 9	E 9	cl	817·5	2·72	·40	·00	E 8	SE 11	2·91	·935	·40	E 9	E 9	285	3·54	·768
	14-1	94	1·26	3·00	11·49	·36	−·01	·9	N 13	N 13	cl	875·5	2·95	·35	·00	N 13	NW 10	3·29	·897	·36	N 11	NW 6	295	3·59	·822
	,,	,,	,,	2·99	11·48	·35	·00	·9	NW 10	NW 6	c	847·9	2·86	,,	,,	,,	,,	,,	·869	·35	,,	,,	,,	3·58	·799
	24-3	86	1·26	2·64	11·35	·35	+·02	·7	NW 11	NW 10	c	800·0	2·70	·35	+·01	NW 10	NW 9	3·17	·852	·35	NW 11	NW 10	288	3·54	·763
	8-2	88	1·26	2·78	11·36	·33	·00	·3	V *l*	N 7	cl	841·9	2·87	·33	·00	N 13	N 11	3·34	·859	·33	V *l*	N 7	309	3·66	·784
	27-2	44	1·26	2·90	11·07	·34	−·01	·6	NW 8	NW 9	c	823·9	2·79	·33	·00	NW 9	NW 11	3·27	·853	·34	NW 8	NW 11	304	3·63	·769
	,,	,,	,,	2·91	11·06	·33	·00	·6	NW 11	NW 11	cl	817·7	2·78	,,	,,	,,	,,	,,	·850	·33	,,	,,	,,	3·63	·766
	28-2	29	1·26	2·81	10·98	·33	·00	·6	NW 10	NW 11	c	817·6	2·77	·33	·00	NW 11	NW 11	3·22	·860	·33	NW 10	NW 11	301	3·61	·767
	18-1	88	1·26	2·96	11·27	·19	·00	·4	N 15	N 16	cl	803·1	2·84	·19	·00	N 16	N 16	3·39	·838	·19	N 15	N 16	312	3·62	·785
	δ Range,	65	·00	·40	·78	·33	..	1·2	.. ..	.. ..	..	75·5	·26	·33	..	.. ..	.. ..	·48	·115	·33	.. ..	.. ..	028	·12	·079
	v Means of 11,	73	1·26	2·84	11·24	4·37	..	64·8	NNW 9		..	831·5	2·79	4·36	..	NNW 9		3·25	·860	4·37	NNW 9		297	3·60	·776
Series 224.	22-2	77	1·26	2·79	11·18	4·24	·00	64·5	.. 0	.. 0	c	809·0	2·82	4·24	·00	.. 0	.. 0	3·04	·927	4·24	.. 0	.. 0	300	3·56	·792
	4-3	0	1·26	2·73	11·03	·23	·00	·5	V *l*	NW 15	cl	797·3	2·78	·23	·00	NW 11	NW 12	3·18	·874	·23	V *l*	NW 15	307	3·60	·772
	27-3	85	1·26	2·69	11·10	·23	·00	·4	.. 0	.. 0	c	754·5	2·63	·23	·00	.. 0	.. 0	3·04	·865	·23	.. 0	.. 0	289	3·50	·751
	8-3	0	1·26	2·70	11·00	·22	·00	·5	NW 19	NW 17	cl	780·2	2·73	·22	·00	NW 18	NW 18	3·35	·815	·22	NW 9	NW 17	307	3·60	·758
	11-2	82	1·26	2·78	11·21	·17	·00	·2	.. 0	V *l*	cl	772·4	2·73	·17	·00	.. 0	V *l*	3·00	·910	·17	.. 0	V *l*	307	3·58	·763
	10-2	72	1·26	2·78	11·16	·17	·00	·2	V *l*	V *l*	c	768·0	2·73	·17	·00	V *l*	V *l*	3·03	·901	·17	V *l*	V *l*	311	3·60	·758
	22-1	88	1·26	2·92	11·25	·16	·00	·3	N 13	N 15	cl	794·0	2·84	·16	·00	N 14	N 18	3·44	·825	·16	N 13	N 15	307	3·57	·796
	13-2	82	1·26	2·80	11·16	·16	·00	·1	N 14	N 14	c	785·7	2·81	·16	·00	N 12	N 14	3·35	·838	·16	N 14	N 14	304	3·56	·789
	21-1	88	1·26	2·95	11·22	·16	·00	·3	.. 0	.. 0	c	774·0	2·76	·16	·00	.. 0	.. 0	3·25	·849	·16	.. 0	.. 0	310	3·59	·769
	24-2	56	1·26	2·74	11·07	·14	·00	·1	.. 0	V *l*	cl	744·1	2·67	·14	·00	V *l*	V *l*	3·09	·864	·14	.. 0	V *l*	303	3·54	·754
	25-2	56	1·26	2·78	11·00	·12	·00	·0	.. 0	V *l*	cl	747·9	2·70	·12	·00	.. 0	.. 0	3·14	·859	·12	.. 0	.. 0	303	3·53	·765
	,,	,,	,,	,,	,,	·12	·00	·0	,, ,,	,, ,,	c	745·1	2·69	,,	,,	,, ,,	,, ,,	,,	·857	·12	,, ,,	,, ,,	,,	3·53	·762
	δ Range,	88	·00	·26	·25	·12	..	·5	.. ..	.. ..	..	64·9	·21	·12	..	.. ..	.. ..	·44	·112	·12	.. ..	.. ..	022	·10	·045
	v Means of 12,	57	1·26	2·79	11·12	4·18	..	64·3	NNW 4		..	772·7	2·74	4·18	..	NNW 5		3·17	·865	4·18	NNW 4		304	3·56	·769
Series 225.	18-2	78	1·26	2·68	10·36	4·13	·00	64·1	.. 0	.. 0	c	760·7	2·74	4·13	·00	.. 0	.. 0	3·14	·873	4·13	.. 0	.. 0	305	3·55	·772
	17-2	76	1·26	2·69	11·05	·12	·00	·1	.. 0	.. 0	cl	776·9	2·80	·12	·00	.. 0	.. 0	3·14	·892	·12	.. 0	.. 0	308	3·56	·787
	8-3	75	1·26	2·67	11·02	·12	+·01	·2	.. 0	.. 0	cl	734·1	2·64	·12	+·01	.. 0	.. 0	3·17	·833	·12	.. 0	.. 0	306	3·55	·744
	10-3	80	1·26	2·71	10·33	·09	−·02	·1	NNW 12	NNW 13	c	743·5	2·70	·10	·00	NNW 11	NNW 12	3·14	·860	·09	NNW 12	NNW 13	299	3·50	·771
	11-3	79	1·26	2·73	10·61	·08	·00	·1	N 6	N 13	cl	747·7	2·73	·08	·00	NNE 7	NE 9	3·04	·898	·08	N 6	N 13	304	3·52	·776
	17-3	78	1·26	2·72	10·57	·08	−·01	·1	NNW 16	NNW 18	c	738·8	2·69	·08	·00	NNW 14	NNW 14	3·20	·841	·08	NNW 16	NNW 18	301	3·50	·769
	13-3	80	1·26	2·72	10·82	·08	·00	·1	.. 0	.. 0	c	736·9	2·68	·08	·00	.. 0	.. 0	3·08	·870	·08	.. 0	.. 0	299	3·49	·768
	14-2	75	1·26	2·77	11·03	·07	·00	63·9	.. 0	.. 0	cl	746·2	2·74	·07	·00	V *l*	V *l*	3·03	·904	·07	.. 0	.. 0	308	3·54	·774
	7-3	19	1·26	2·75	10·99	·06	·00	64·1	.. 0	.. 0	c	733·6	2·69	·06	·00	.. 0	.. 0	3·08	·873	·06	.. 0	.. 0	310	3·55	·758
	18-3	78	1·26	2·71	10·23	·05	−·02	·1	.. 0	V *l*	cl	719·4	2·65	·05	−·02	.. 0	V *l*	2·90	·914	·05	.. 0	V *l*	299	3·48	·761
	20-2	74	1·26	2·80	10·44	·04	·00	63·9	V *l*	V *l*	cl	737·5	2·73	·04	·00	V *l*	V *l*	3·13	·872	·04	V *l*	V *l*	307	3·52	·776
	15-3	78	1·26	2·73	10·26	·04	·00	·9	N 3	V *l*	cl	725·8	2·68	·04	·00	.. 0	.. 0	3·05	·879	·04	N 3	V *l*	302	3·49	·768
	6-3	18	1·26	2·80	10·92	·02	·00	64·0	V *l*	V *l*	c	711·4	2·64	·02	·00	NW 11	NW 6	3·14	·841	·02	V *l*	V *l*	315	3·56	·742
	15-2	78	1·26	2·71	10·28	·00	.00	63·7	SE 8	NE 6	c	739·2	2·78	·00	·00	E 8	NE 7	3·10	·897	·00	SE 8	NE 6	318	3·57	·779
	δ Range,	62	·00	·13	·82	·13	..	·5	.. ..	.. ..	..	65·5	·16	·13	..	.. ..	.. ..	·30	·081	·13	.. ..	.. ..	019	·09	·045
	v Means of 14,	69	1·26	2·73	10·64	4·07	..	64·0	N ♭ W 3		..	739·4	2·71	4·07	..	N ♭ W 3		3·10	·875	4·07	N ♭ W 3		306	3·53	·760

Digitized by Google

TABLE LXX.

CENTRAL SURFACE AND MEAN VELOCITIES.

Sites in Distributaries.

Serial No.	1 DATE, 1879.	2 Control.	2 Fall of Water-Surface.	3 Rod-Velocity Results. Hyd. Mean Depth. R	Variation of water-level.	Surface-Breadth. b	Wind. From Direction.	Wind. From Velocity.	Wind. To Direction.	Wind. To Velocity.	Timekeeper's Initial.	Cubic Discharge in cub. feet per sec. D	Mean Velocity. V	4 Central Surface Velocity Results. Hyd. Mean Depth. R	Variation of water-level.	Wind. From Direction.	Wind. From Velocity.	Wind. To Direction.	Wind. To Velocity.	(Central Surface Velocity. [Mean of 48 trials]) v_o	Ratio $V \div v_o$. c	Distributary.
231	29-3	?	?	2·79	·00	25·0	..	0	..	0	C	190·7	2·51	2·79	·00	..	0	..	0	2·95	·851	Right Jaoli.
	„	?	?	·79	+·02	·0	..	0	..	0	B	191·1	2·52								·854	
	δ Range,	..	..	·00	..	·0	..	..	..	..	..	·4	·01	..	..	..	..	..	..	..	..	·003	
	v Means of 2,	..	..	2·79	..	25·0	Calm.				..	190·9	2·52	2·79	..	Calm.				2·95	·853	
232	28-3	?	?	1·99	−·02	22·0	..	0	..	0	C	97·7	2·10	1·98	·00	..	0	..	0	2·51	·837	
	„	?	?	·98	·00	·0	..	0	..	0	B	97·7	2·10								·837	
	δ Range,	..	..	·01	..	·0	..	..	..	..	..	·0	·00	..	..	..	..	..	..	..	..	·000	
	v Means of 2,	..	..	1·99	..	22·0	Calm.				..	97·7	2·10	1·98	..	Calm.				2·51	·837	
233	13-3	Not observed	Not observed	2·35	+·05	14·3	..	0	..	0	B	90·5	2·14	2·17	−·05	..	0	..	0	2·49	·860	Mansurpur.
	„			·33	−·15	·3	..	0	N	l	C	89·5	2·14								·860	
	18-3			·31	+·06	·0	..	0	..	0	C	84·9	2·10	2·29	+·02	..	0	..	0	2·43	·864	
	„			·28	·00	·0	..	0	..	0	B	80·6	2·03								·835	
	δ Range,	..	..	·07	..	·3	..	..	..	..	..	9·9	·11	·12	..	..	..	..	..	·06	·029	
	v Means of 4,	..	..	2·32	..	14·2	N	l			..	86·4	2·10	2·23	..	Calm.				2·46	·850	
234	12-3	?	?	2·10	·00	13·8	..	0	..	0	C	72·6	2·05	2·10	·00	..	0	..	0	2·44	·840	
236	21-3	?	?	1·16	·00	13·5	W	l	W	b	B	25·3	1·49	1·16	−·06	W	b	NW	b	1·79	·832	Miranpur.
	„	?	?	·16	+·01	·5	NW	b	NW	b	C	25·7	1·49								·832	
	δ Range,	..	..	·00	..	·0	..	..	..	..	..	·4	·00	..	..	..	..	..	..	..	·000	
	v Means of 2,	?	?	1·16	..	13·5	WNW	b			..	25·5	1·49	1·16	..	WNW	b			1·79	·832	
237	19-3	?	?	2·16	−·01	13·0	NW	b	W	b	C	62·8	1·82	2·17	−·02	NW	b	NW	b	2·26	·805	Pimora.
	„	?	?	·16	+·06	·0	NW	l	NW	l	B	63·3	1·84								·814	
	δ Range,	..	..	·00	..	·0	..	..	..	..	..	·5	·02	..	..	..	..	..	..	..	·009	
	v Means of 2,	?	?	2·16	..	13·0	NW	b			..	63·1	1·83	2·17	..	NW	b			2·26	·810	
238	20-3	?	?	1·96	−·02	12·5	..	0	W	l	B	52·2	1·79	1·94	−·05	W	l	W	l	2·09	·856	
	„	?	?	·91	−·06	·5	W	l	W	l	C	47·9	1·71								·818	
	δ Range,	..	..	·05	..	·0	..	..	..	..	..	4·3	·08	..	..	..	..	..	..	..	·038	
	v Means of 2,	?	?	1·94	..	12·5	W	l			..	50·0	1·75	1·94	..	W	l			2·09	·837	

Digitized by Google

TABLES LVII. AND LXXI.—LXXIV.

MISCELLANEOUS VELOCITY EXPERIMENTS.

Surface, Bed, and Mean Velocities and Discharges, ...	Series 241 to 243,	Table LVII. (*see* page 114).
Experiments on Length of Run—		
Mean Velocities and Discharges,	„ 251,	Table LXXI.
Central Surface Velocities, ...	„ 252,	„ LXXII.
Unsteady Motion, Central Surface Velocities, ...		„ LXXIII.
Unsteady Motion, Central Velocities, ...		„ LXXIV.

Series 241 to 243, (Table LVII.) are Surface-, Bed-, and Rod-Velocity work executed in concert; the velocity-measurements of each kind were made in as rapid succession as possible, one after the other, upon each vertical from Left Bank to Right Bank. Thus one SET of each kind was executed under the same External Conditions, and the Mean Results of each SERIES are therefore completely intercomparable, being under same conditions, (though not freed from effects of Unsteady Motion.) For explanation of arrangement of Table, *see* pages 57, 67.

Series 251, 252 are Experiments on Length of Run. Each Float was timed in passing under 4 Ropes in succession, so that velocity-measurements are deducible from the same Float through four different RUNS. The discrepancies are shown in the bottom lines (marked δ).

Series 251 contains 4 SETS of Mean Velocity-work (*i.e.*, 1 Set for each of the four Runs) similar to those of Tables L., LI. For explanation, *see* page 67.

Series 252 contains the "Timings" (through the four Runs) of the 48 Floats used for a single Average Central Surface Velocity-Measurement (v_o), as used in Col. 4 of Tables LVIII. to LXX.

Tables LXXIII. and LXXIV. illustrate Unsteady Motion. Table LXXIII. is a selection (from Tables LVIII. to LXX.) of 17 Sets of Central Surface Velocity-Measurements, (each Set consisting of 48 trials done in rapid succession) showing the maximum, minimum and mean velocity Results, and also the Range thereof in each Set (both actual and per centum) at eight different Sites, as well as the duration of each Experiment (in minutes), the state of the Wind at beginning and end thereof, and the maximum Deviation (from the Pendants of Upper and Lower Ropes) admitted for each Float.

Table LXXIV. is a similar selection of 10 Sets of Central Velocity-Measurements at various depths with different Instruments at two Sites, showing Results as in Table LXXIII. These Sets do not appear in the Tables preceding this.

Digitized by Google

EXPERIMENT ON LENGTH OF RUN. TABLE LXXI.

MEAN VELOCITIES AND DISCHARGES—BELRA SITE.

[*Instruments*—1″ *tin Tube-Rods*].

These 4 SETS were executed together throughout, (the four velocity-measurements of each Float-Course being taken *from the same Float*,) so that the External Conditions are the same for all 4 Sets.

1	2					3	4	5																		6	7	8
Serial No.	Date, 1879.	DEPTH. At Gauge.	Variation.	Central.	Surface-Breadth.	Area.	WIND.	Timekeeper's Initial.	MEAN VELOCITIES past each vertical. Each Float was timed in passing under four Ropes in succession by same Timekeeper; [Each Velocity is the mean of three observations].																		CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.	LENGTH OF RUN.
									Left of centre.								Centre.	Right of centre.										
									Edge	Side-slope m	Side-slope 90	80	70	60	40	20		20	40	60	70	80	Side-slope 90	Side-slope m	Edge			
		h		H	b	A																				D	V	
251	11·2	5·88	−·05	8·12	186·9	1473·4	Calm	P	?0	1·76	2·03	2·88	2·68	3·06	3·00	2·94	3·00	3·06	3·23	3·06	2·73	2·50	1·38	1·25	?0	4,805	2·92	Upper 25′ Run.
									?0	1·76	2·26	2·94	2·88	3·03	3·13	3·03	3·33	3·03	3·16	3·16	2·94	2·70	1·74	1·52	?0	4,508	3·06	Lower 25′ Run.
									?0	1·76	2·07	2·84	2·79	3·13	3·09	2·97	3·19	3·19	3·17	3·06	2·87	2·54	1·64	1·37	?0	4,415	3·00	Middle 50′ Run.
									?0	?	2·10	2·88	2·78	3·08	3·08	2·98	3·17	3·12	3·18	3·08	2·85	2·57	1·59	?	?0	4,400	2·99	Outer 100′ Run.
3 Ranges,		·00	..	·00	·0	·0	..	..	?	·00	·23	·06	·20	·03	·13	·09	·33	·03	·07	·10	·21	·20	·36	·27	?	198	·14	in 25′ Runs.
		·00	..	·00	·0	·0	..	..	?	?	·03	·04	·01	·05	·01	·01	·02	·07	·01	·02	·02	·03	·05	?	?	15	·01	in 50′ & 100′ Runs.

Digitized by Google

EXPERIMENT ON LENGTH OF RUN.

TABLE LXXII.

Central Surface Velocities—Belra Site.

[*Instrument*—3″ *Surface-Floats*].

Date, 13-2-'79—Gauge-Depth, $h = 5'{\cdot}82$; Variation = ·00; Central Depth, $H = 8'{\cdot}06$; Surface-Breadth, $b = 186'{\cdot}8$. Wind, Down-stream, Light at first, Calm at end.

These 4 SETS were executed together throughout, (the four velocity-measurements of each Float-Course being taken *from the same Float*,) so that the External Conditions are the same for all 4 Sets.

Serial No.	Date.	Run.	Timekeeper.	Timings of Floats. [Each Float was timed past four Ropes in succession by same Timekeeper]. Number of Float. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Time-unit.
252	13-2-'79	Upper 25′	A	28	27	30	27	30	30	30	27	26	29	26	28	30	31	30	30	29	30	30	30	30	28	28	30	Quarter-seconds.
		Lower 25′	A	28	26	30	26	26	30	32	26	25	28	29	28	29	26	28	28	28	28	30	30	28	30	32	30	Quarter-seconds.
		Middle 50′	A	26½	26½	29	27½	26½	29	31	27½	27	28	27	28	27	32	31	28	27½	29	30	28	29	28	29½	29	Half-seconds.
		Outer 100′	A	27¼	26½	29½	27	27¼	29½	31	27	26¼	28¼	27¼	28	28¼	30½	30	28½	28	29	30	29	29	28½	29½	29½	Seconds.
δ Range		of 25′ Runs,		0	1	0	1	4	0	2	1	1	1	3	0	1	5	2	2	1	2	0	0	2	2	4	0	Quarter-seconds.
		of 50′ & 100′ Runs,		¾	0	½	½	¾	½	0	½	¾	¼	¼	0	1¼	1¾	1	½	½	0	0	1	0	½	¼	½	Half-seconds.

				Number of Float. 25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
252	13-2-'79	Upper 25′	P	28	29	30	28	27	29	30	28	29	28	30	28	28	26	31	32	28	29	29	30	31	36	28	34	Quarter-seconds.
		Lower 25′	P	28	27	28	29	30	27	26	29	28	25	30	28	30	28	32	29	32	27	27	29	29	28	29	27	Quarter-seconds.
		Middle 50′	P	28	28½	28	26	26	28	27½	28	27	29	30	29	28	27½	31½	31½	28	29	28	27	30	31	27½	29½	Half-seconds.
		Outer 100′	P	28	28¼	28½	27¼	27¼	28	27¾	28¼	27¾	27¾	30	28½	28½	27¼	31½	31	29	28½	28	28¼	30	31⅛	28	30	Seconds.
δ Range		of 25′ Runs,		0	2	2	1	3	2	4	1	1	3	0	0	2	2	1	3	4	2	2	1	2	8	1	7	Quarter-seconds.
		of 50′ & 100′ Runs,		0	¼	½	1¼	1¼	0	¼	¼	¾	1¼	0	⅓	½	¼	0	½	1	½	0	1¼	0	½	⅓	½	Half-seconds.

Digitized by Google

UNSTEADY MOTION—CENTRAL SURFACE VELOCITIES. TABLE LXXIII.

[*Instruments—3″ Surface-Floats*].

These Sets are selected from those in Tables LVIII to LXX: two Sets for each Site, one near the highest and one near the lowest water-level available in calm weather.

Reference No.	Date, 1876-79.	Site.	Cross-Section Data. Shape of Section.	Surface-Breadth.	Central Depth.	Velocity sought.	Instrument.	Duration of Experiment in minutes.	Number of Trials.	Wind. From Directn.	Wind. From Velocy.	Wind. To Directn.	Wind. To Velocy.	Max. Deviation admitted. Left.	Max. Deviation admitted. Right.	Velocities. Observed Max.	Velocities. Observed Min.	Velocities. Means of first half-set.	Velocities. Means of last half-set.	Velocities. Means of whole.	Range of velocities. Actual.	Range of velocities. Per cent. (of mean).
1	24-2-79	Jaolí, ...	Trapezoidal, ...	192	8·12	Central Surface Velocity.	3″ Surface Floats. [3″ × ½″ pine Discs].	30	48	Calm				2′	2′	3·57	2·94	3·31	3·29	3·30	·63	19·1
2	11-3-79			191	6·72			35	48	Calm				2′	2′	3·33	2·56	3·02	3·06	3·04	·77	25·3
3	27-3-79	Belra, ...	Trapezoidal, ...	189	9·88			35	48	Calm				2′	2′	4·00	3·17	3·61	3·57	3·59	·83	23·1
4	14-2-79			187	7·98			35	48	Calm				2′	2′	3·77	3·08	3·39	3·38	3·38	·69	20·4
5	23-4-78	Fifteenth Mile, ..	Trapezoidal, ...	175	10·04			20	48	Calm				2′	2′	5·00	4·00	4·57	4·59	4·58	1·00	21·8
6	16-4-78			175	9·19			15	48	Calm				2′	2′	5·00	4·00	4·47	4·44	4·46	1·00	22·4
7	29-5-78	Solání Embankment Main Site, ...	Trapezoid above 4′ Rectangle below 4′,	171	11·24			45	48	Calm				2′	2′	4·65	4·08	4·38	4·36	4·37	·57	13·0
8	19-9-78		Rectangular, ...	150	2·28			60	48	Calm				2′	2′	1·08	·88	·96	1·00	·98	·20	20·4
9	31-5-77	Solání Right Aqueduct,	Rectangular, ...	82	10·02			70	48	Calm				2′	2′	5·00	4·17	4·56	4·53	4·55	·83	18·2
10	31-7-76			85	3·59			20	48	Calm				2′	2′	3·03	2·67	2·91	2·89	2·90	·36	12·4
11	1-9-76	Solání Right Aqueduct (Left Aqueduct closed),	Rectangular, ...	85	4·00			28	48	Calm				2′	2′	6·67	5·26	5·80	5·75	5·79	1·41	24·4
12	27-1-79	Kamhera, ...	Trapezoidal, ...	65	5·22			40	48	Calm				1′	1′	3·70	3·03	3·35	3·31	3·33	·67	20·1
13	15-3-79			64	4·41			40	48	Calm				1′	1′	3·33	2·86	3·04	3·06	3·05	·47	15·4
14	29-3-79	Right Jaolí Distributary,	Trapezoidal, ...	25	3·82			50	48	Calm				3″	3″	3·13	2·86	2·96	2·94	2·95	·27	9·2
15	28-3-79			22	2·56			40	48	Calm				3″	3″	2·70	2·33	2·47	2·53	2·51	·37	14·7
16	18-3-79	Mansúrpur Distributary,	Trapezoidal, ...	14	3·39			25	48	Calm				3″	3″	2·63	2·27	2·41	2·44	2·43	·36	14·8
17	12-3-79			13¾	3·08			55	48	Calm				3″	3″	2·70	2·27	2·42	2·46	2·44	·43	17·6

Digitized by Google

TABLE LXXIV.

UNSTEADY MOTION—CENTRAL VELOCITIES.

[*Instruments—Double Floats, Current Meters, and loaded 1″ Rods*].

* In Sets Nos. 9 and 10 the actual Deviation of each Float was recorded.

Reference No.	Date, 1875-78.	Site.	Cross-Section Data: Shape of Section.	Cross-Section Data: Surface-Breadth.	Cross-Section Data: Central Depth.	Velocity sought.	Instrument.	Duration of Experiment in minutes.	Number of Trials.	Wind: From Directn.	Wind: From Velocity.	Wind: To Directn.	Wind: To Velocity.	Max. Deviation admitted: Left.	Max. Deviation admitted: Right.	Velocities: Observed Max.	Velocities: Observed Min.	Velocities: Means of first half-set.	Velocities: Means of last half-set.	Velocities: Means of whole.	Range of velocities: Actual.	Range of velocities: Per cent. [of mean].
1	7-6-77	Solání Right Aqueduct,	Rectangular, ..	82½	9·75	At 5′ depth,	Double-Float, (1⅛″ copper Ball),	80	48	?	?			2′	2′	4·65	3·92	4·35	4·26	4·31	·73	16·9
2	,,			,,	9·65	ditto,	Current Meter, (Moore's).	85	12	V	12	V	20	..	..	4·36	3·84	4·13	4·11	4·12	·52	12·6
3	11-3-75	Solání Right Aqueduct,	Rectangular, ..	84½	7·55	At 6′ depth,	Double-Float, (3″ wood Ball).	?	48	..	0	..	0	2′	2′	3·85	2·78	3·35	3·43	3·39	1·07	31·6
4	,,			,,	,,	ditto,	Double-Float, (3″ tin Discs).	?	48	..	0	..	0	2′	2′	4·08	3·03	3·50	3·42	3·46	1·03	30·3
5	,,			,,	,,	ditto,	Twin, 3″ wood Balls.	?	48	..	0	..	0	2′	2′	4·00	3·08	3·50	3·47	3·48	·92	26·4
6	,,			,,	,,	Surface,	3″ pine Discs.	?	48	..	0	..	0	2′	2′	4·17	3·03	3·75	3·80	3·78	1·14	30·2
7	9-6-76	Solání Right Aqueduct,	Rectangular, ..	82	9·90	At 9′ depth,	Double-Float, (1⅛″ copper Ball),	90	40	E	5	NE	12	2′	2′	5·00	3·92	4·42	4·37	4·41	1·08	24·5
8	,,			,,	9·98	ditto,	Current Meter, (Moore's).	90	20	NE	12	V	15	..	..	4·74	2·77	3·37	3·50	3·44	1·97	57·3
9	19-3-78	Solání Embankment, Main Site,	Trapezoid above 4′, Rectangle below 4′,	168	10·25	Surface,	3″ pine Discs.	225	100	W	5	S	4	*12′	*11′	5·13	3·85	4·36	4·33	4·35	1·28	29·4
10	,,			,,	,,	Mean, (on centre vertl.)	1″ tin Rod, (immersed 9′).		100	,,	,,	,,	,,	*5′	*5′	4·44	3·33	3·95	3·86	3·91	1·11	28·4

Digitized by Google

TABLES LXXV.—LXXXII.

Water-Level, Surface-Convexity, and Surface-Slope.

Still and Free Water-Levels, ...	Table	LXXV.
Effect of Wind on Water-Level at Edges, ...	„	LXXVI.
Convexity of Water-Surface, ...	„	LXXVII.
Convexity of Water-Surface, ...	„	LXXVIII.
Surface-Slope Measurements in 2000′ and 4000′ Slope-Lengths, ...	„	LXXIX.
Surface-Slope Measurements on Both Banks { at some hours' interval, ...	„	LXXX.
{ at a few minutes' interval,	„	LXXXI.
Simultaneous Surface-Slope Measurements at several Sites, ...	„	LXXXII.

Table LXXV. shows the Reduced Levels of Water-Surface as determined *in succession*, (not simultaneously) by a Still Water Gauge (Stand-Pipe) and by a Range of Pegs in the Free Channel showing the Still and Free Water-Levels respectively, at the Fifteenth Mile (Old Site) and at the two Slope Points 1000′ above and 1000′ below, Left Bank.

Table LXXVI. shows the effect of high cross wind in raising and depressing the Surface-Level at the Edges : each pair of readings (one for either Bank) being *strictly simultaneous*.

Tables LXXVII. and LXXVIII. show the difference of surface-level at opposite banks, and the elevation (or depression) of surface at centre above (or below) the surface at either edge: the readings of variable levels (h', C', c', h'', C'', c'') being made *strictly simultaneously*.

Tables LXXIX.—LXXXII. show details connected with various Surface-Slope Measurements computed as the quotient ;—

$$\text{“Surface-Slope”} = \frac{\text{Surface-Fall in Slope-Length}}{\text{Slope-Length}}.$$

In every case the two water-level determinations concerned in each (individual) Surface-Slope Measurement were *strictly simultaneous*. In all cases 3 decimals (·000) must be prefixed to the Surface-Slope Results by the reader, (these having been omitted to save space).

Table LXXIX. shows details of Surface-Slope Measurements in different (2000′ and 4000′) Slope-Lengths on same bank, symmetric about the centre of the Site ; those of the 4000′ Slope-Lengths being made about 5 minutes (being the time occupied in traversing the extra distance) after those of 2000′ Slope-Length, and by the same Observers.

Tables LXXX., LXXXI., show details connected with Surface-Slope Measurements on both Banks, each pair by the same Observers. Those on right bank in Table LXXX. were made 2 or 3 hours after (being the time occupied by a Discharge-Measurement) those on left bank at same Site. Those on right bank in Table LXXXI. were made about 2 or 3 minutes after (being the time occupied in crossing the Canal) those on left bank.

Table LXXXII. shows details connected with Surface-Slope Measurements *executed simultaneously* at three Sites in the Roorkee Reach.

Digitized by Google

STILL AND FREE WATER-LEVELS.

TABLE LXXV.

AT FIFTEENTH MILE, (OLD SITE,) AND AT (THE SLOPE-POINTS) 1000′ ABOVE AND 1000′ BELOW, (LEFT BANK.)

[*Instruments—Temporary Still Water (Stand-Pipe) Gauge, and Temporary Free (Peg) Gauge.*]

[+ and − indicate Free Water-Level (shown by Peg) higher or lower than Still Water-Level (shown by Stand-Pipe).]

DATE, 1878.	WATER-LEVEL at 1000′ above Experimental Site.					WATER-LEVEL at Experimental Site.						WATER-LEVEL at 1000′ below Experimental Site.					REDUCED LEVELS above Karáchí mean sea level
	Readings on		Reduced Level		Diffce.	WIND.		Readings on		Reduced Level		Diffce.	Readings on		Reduced Level		Diffce.	
	Pipe.	Peg.	Pipe.	Peg.		Dirn.	Vely.	Pipe.	Peg.	Pipe.	Peg.		Pipe.	Peg.	Pipe.	Peg.		
29-3	3·920	·61 to ·61	3·420	3·460	+·040	N	8	3·300	·61 to ·59	3·200	3·230	+·030	..	.. ..	..	..	..	
	3·910	·65 „ ·61	3·410	3·480	+·070	NW	7	3·300	·62 „ ·60	3·200	3·240	+·040	3·870	·68 to ·66	2·960	3·000	+·040	Stand Pipe Indicators (Deduct 6′ for length of Float-Sticks) at 1000′ above Experl. Site, .. 875·50, throughout.
4-4	3·950	·64 „ ·63	3·450	3·485	+·035	..	0	4·310	·67 „ ·64	3·230	3·285	+·055	3·950	·72 „ ·70	3·040	3·040	·000	at Experimental Site, .. 875·90, on 29-3-78; 875·92, from 4-4-78.
	3·960	·67 „ ·66	3·460	3·515	+·055	..	0	4·310	·67 „ ·64	3·230	3·285	+·055	3·940	·73 „ ·71	3·030	3·050	+·020	at 1000′ below Experl. Site, .. 875·00, throughout.
8-4	3·930	·62 „ ·61	3·430	3·465	+·035	..	0	4·300	·62 „ ·60	3·220	3·240	+·020	3·920	·69 „ ·67	3·010	3·010	·000	
	4·030	·74 „ ·73	3·530	3·585	+·055	..	0	4·420	·75 „ ·74	3·340	3·375	+·035	4·030	·80 „ ·78	3·120	3·120	·000	
10-4	4·280	·99 „ ·98	3·780	3·835	+·055	..	0	4·660	·97 „ ·96	3·580	3·595	+·015	..	.. ..	..	..	..	
	4·280	·99 „ ·98	3·780	3·835	+·055	..	0	4·650	·99 „ ·95	3·570	3·600	+·030	..	.. ..	..	..	..	
15-4	3·680	·37 „ ·36	3·180	3·215	+·035	SW	4	4·060	·39 „ ·36	2·980	3·005	+·025	3·630	·44 „ ·42	2·720	2·760	+·040	at 1000′ above Experl. Site, .. 875·85, throughout.
	3·640	·32 „ ·31	3·140	3·165	+·025	..	0	4·030	·36 „ ·32	2·950	2·970	+·020	3·600	·41 „ ·39	2·690	2·730	+·040	at Experimental Site, .. 872·63, throughout.
16-4	3·440	·11 „ ·10	2·940	2·955	+·015	..	0	3·800	·14 „ ·11	2·720	2·755	+·035	3·380	·17 „ ·15	2·470	2·490	+·020	at 1000′ below Experl. Site, .. 872·33, till 16-4-78; 873·27, from 23-4-78.
	3·440	·13 „ ·12	2·940	2·975	+·035	..	0	3·810	·15 „ ·12	2·730	2·765	+·035	3·380	·22 „ ·19	2·470	2·535	+·065	
23-4	4·280	·97 „ ·96	3·780	3·815	+·035	..	0	4·670	·99 „ ·97	3·590	3·610	+·020	4·325	·10 „ ·08	3·415	3·360	−·055	
	4·260	·96 „ ·95	3·760	3·805	+·045	..	0	4·660	·98 „ ·96	3·580	3·600	+·020	4·330	·08 „ ·07	3·420	3·345	−·075	
24-4	4·280	·97 „ ·97	3·780	3·820	+·040	N	3	4·680	·99 „ ·97	3·600	3·610	+·010	4·380	·08 „ ·07	3·470	3·345	−·125	
	4·275	·98 „ ·97	3·775	3·825	+·050	..	0	4·670	1·00 „ ·98	3·590	3·620	+·030	4·360	·11 „ ·09	3·450	3·370	−·080	
29-4	4·280	·95 „ ·95	3·780	3·800	+·020	..	0	4·670	·98 „ ·96	3·590	3·600	+·010	4·250	·09 „ ·08	3·340	3·355	+·015	
	4·250	·92 „ ·92	3·750	3·770	+·020	..	0	4·650	·96 „ ·94	3·570	3·580	+·010	4·245	·08 „ ·06	3·335	3·340	+·005	
20-4	4·250	·91 „ ·91	3·750	3·760	+·010	..	0	4·640	·94 „ ·93	3·560	3·565	+·005	4·370	·05 „ ·05	3·460	3·320	−·140	
	4·245	·92 „ ·91	3·745	3·765	+·020	..	0	4·620	·96 „ ·94	3·540	3·580	+·040	4·345	·08 „ ·06	3·435	3·340	−·095	
1-5	4·23	·89 „ ·89	3·730	3·740	+·010	..	0	4·610	·92 „ ·90	3·530	3·540	+·010	4·190	·03 „ ·01	3·280	3·290	+·010	
	..	.. ..	..	..	..	..	0	4·600	·90 „ ·90	3·520	3·530	+·010	..	.. ..	..	..	..	
29-5	..	.. ..	..	..	..	NW	7	5·340	·97 „ ·96	3·705	3·710	+·005	..	.. ..	..	..	..	Tops of Pegs, ... at Experimental Site, .. 872·63, throughout.
	..	.. ..	..	..	..	NE	3	5·360	·99 „ ·98	3·725	3·730	+·005	..	.. ..	..	..	..	at 1000′ below Experl. Site, .. 872·33, till 16-4-78; 873·27, from 23-4-78.
Range,	in 21 trials,		·840	·880	+·060	in 24 trials,				1·005	·975	·050	in 18 trials,		1·000	·880	·205	
Means,	„ „		3·539	3·575	+·036	„ „				3·377	3·401	+·024	„ „		3·118	3·100	−·018	

Note.—870′ is omitted in the Reduced Levels in Table for shortness.

Digitized by Google

TABLE LXXVI.

EFFECT OF WIND ON WATER-LEVEL AT EDGES.

Solání Embankment, Main Site.

The readings of variable level, (viz, h', h'',) were made strictly simultaneously.

Date.	Expert. No.	Wind. Direction.	Wind. Velocity.	Depth on top immersed step. L. Edge. h'	Depth on top immersed step. R. Edge. h''	Difference of Surface-Level at edges. L>R	Difference of Surface-Level at edges. R>L	General Data. Depth. Gauge.	Depth. Central.	Surf.-Breadth.	State of Canal.	Highest wet step. No.	Highest wet step. Diffce. of Level.	Abbreviations.	Diffce. of Surface-Level at edges.
19-8-'78	1	W	17	·34 to ·28	·46 to ·45	·035	..	7·29	about 8·47	161·7	Rising.	8th on both Banks.	·180, (L > R)	L > R means Left higher than Right.	·180 − (h″ − h′).
	2	..	..	·34 „ ·28	·47 „ ·44	·035	..							R > L means Right higher than Left.	
	3	..	..	·35 „ ·29	·48 „ ·44	·040	..								
	4	..	..	·35 „ ·28	·47 „ ·46	·030	..								
	5	..	..	·33 „ ·28	·48 „ ·46	·015	..								
	6	W	18	·36 „ ·28	·50 „ ·45	·025	..								
Range,		..	..	·08	·06	·025	..								
Means,		W	18	..	..	·030	..								
30-5-'79	1	E	27	·25 to ·15	·55 to ·25	·000	·000	10·12	about 11·30	171·0	Falling?	4th on both Banks.	·200, (L > R)		·200 − (h″ − h′).
	2	..	..	·25 „ ·12	·49 „ ·28	·000	·000								
	3	..	..	·25 „ ·12	·51 „ ·29	..	·015								
	4	..	..	·26 „ ·10	·48 „ ·28	·000	·000								
	5	..	..	·25 „ ·10	·55 „ ·27	..	·035								
	6	..	..	·29 „ ·15	·50 „ ·23	·055	..								
	7	..	..	·24 „ ·09	·49 „ ·26	..	·010								
	8	..	..	·25 „ ·05	·52 „ ·27	..	·045								
	9	..	..	·28 „ ·11	·54 „ ·28	..	·015								
	10	E	30	·25 „ ·05	·55 „ ·29	..	·070								
Range,		..	..	·24	·32	·055	·070								
Means,		E	29	..	..	..	·014								

TABLE LXXVII.

CONVEXITY OF WATER-SURFACE.

Solání Embankment, Main Site. 19-5-'77.

The readings of variable levels, (*viz*, h', C', c', h'', C'', c'',) were made strictly simultaneously.

Each Reading-entry is the mean of three Readings.

For explanation of Symbols and Results, see Table LXXVIII.

Expert No.	Readings from Left Bank. H′	h′	C′	c′	Readings from Right Bank. H″	h″	C″	c″	Difference of Level of Water-Surface. At Edges. L>R	R>L	Elevation of centre above L. Edge	R. Edge	Mean of Edges.	General Data.
1 to 3	4·765	·025	4·667	·089	4·809	·219	4·547	·087	..	004	−·016	−·044	−·030	Depth above datum = 9·23
4 „ 6	„	·027	4·609	·120	„	·225	4·492	·135	..	·008	+·009	−·043	−·017	Central depth = 10·41
7 „ 9	4·760	·034	4·619	·109	4·850	·228	4·506	·098	..	·004	−·002	+·018	+·008	Surface-breadth = 168·7
10 „ 12	„	·031	4·640	·092	„	·226	4·528	·082	..	·005	−·003	+·014	+·006	Wind, Calm throughout.
Range,	·005	·009	·058	·031	·041	·009	·055	·053	..	·004	·025	·062	·038	State of Canal, Rising.
Means,	..	..	..	..	..	..	..	..	..	·005	−·003	−·014	−·008	Number of top immersed step = 5th
														Diffce. of Level of top immersed steps on either bank = ·190 (L > R)

Digitized by Google

TABLE LXXVIII.

CONVEXITY OF WATER-SURFACE.

Soláni Embankment, Main Site. 23-6-'77.

[The readings of variable levels, (viz. h', c', c', h'', c'', c''), of each line were made strictly simultaneously].

Expert. No.	Readings from Left Bank.				Readings from Right Bank.				Difference of Surface-Levels at Edges.		Elevation of centre above		
	h'		c'	c'	h''		c''	c''	R>L	L>R	L. Edge	R. Edge	Mean of Edges.
	H' = 4·618 throughout.				H'' = 4·725 throughout.								
1	·075 to ·045	4·390 to 4·380		·195 to ·180	·263 to ·245	4·300 to 4·290		·200 to ·150	·002	..	−·015	+·001	−·007
2	·070 „ ·050	4·390 „ 4·380		·190 „ ·180	·261 „ ·240	4·300 „ 4·290		·190 „ ·140	·005	..	−·012	+·014	+·001
3	·060 „ ·040	4·400 „ 4·385		·190 „ ·175	·263 „ ·238	4·305 „ 4·295		·180 „ ·140	..	·005	−·007	+·014	+·004
4	·085 „ ·040	4·390 „ 4·375		·180 „ ·170	·270 „ ·232	4·300 „ 4·285		·210 „ ·160	·008	..	−·002	−·004	−·003
5	·090 „ ·050	4·420 „ 4·405		·150 „ ·140	·266 „ ·244	4·325 „ 4·315		·160 „ ·130	·011	..	−·010	+·005	−·003
6	·080 „ ·060	4·420 „ 4·410		·150 „ ·135	·270 „ ·242	4·325 „ 4·320		·150 „ ·120	·010	..	−·010	+·011	+·001
7	·080 „ ·060	4·435 „ 4·420		·140 „ ·115	·276 „ ·250	4·350 „ 4·330		·140 „ ·090	·003	..	−·007	+·007	Nil.
8	·080 „ ·050	4·440 „ 4·430		·130 „ ·110	·280 „ ·252	4·355 „ 4·340		·140 „ ·080	..	·005	−·002	+·001	−·001
9	·080 „ ·060	4·450 „ 4·435		·115 „ ·105	·275 „ ·254	4·360 „ 4·345		·150 „ ·090	·001	..	−·005	−·012	−·009
10	·090 „ ·050	4·450 „ 4·440		·115 „ ·100	·273 „ ·252	4·360 „ 4·350		·140 „ ·070	·003	..	−·005	+·002	−·002
11	·080 „ ·050	4·445 „ 4·435		·115 „ ·100	·280 „ ·256	4·365 „ 4·350		·140 „ ·080	..	·007	+·010	−·011	−·001
12	·090 „ ·050	4·550 „ 4·555		·095 „ ·085	·255 „ ·280	4·370 „ 4·365		·120 „ ·070	..	·002	−·095	−·005	−·050
13	·095 to ·055	4·285 to 4·280		·270 to ·250	·320 to ·280	4·200 to 4·190		·280 to ·265	..	·029	−·003	−·041	−·022
14	·098 „ ·060	4·295 „ 4·280		·260 „ ·240	·310 „ ·290	4·205 „ 4·195		·265 „ ·255	..	·025	−·002	−·033	−·018
15	·100 „ ·065	4·295 „ 4·290		·265 „ ·250	·280 „ ·260	4·205 „ 4·195		·280 „ ·255	·009	..	−·018	−·011	−·015
16	·100 „ ·062	4·315 „ 4·300		·230 „ ·210	·290 „ ·270	4·225 „ 4·210		·260 „ ·230	..	·003	+·011	−·016	−·003
17	·080 „ ·064	4·320 „ 4·305		·240 „ ·220	·290 „ ·255	4·300 „ 4·250		·260 „ ·235	..	·005	Nil.	−·018	−·009
18	·100 „ ·056	4·320 „ 4·310		·230 „ ·220	·280 „ ·265	4·250 „ 4·250		·255 „ ·240	·001	..	−·003	+·007	+·002
19	·100 „ ·057	4·305 „ 4·290		·230 „ ·215	·280 „ ·270	4·210 „ 4·200		·255 „ ·235	·000	·000	+·016	+·002	−·009
20	·096 „ ·062	4·315 „ 4·305		·245 „ ·215	·285 „ ·265	4·225 „ 4·210		·260 „ ·245	·000	·000	−·004	−·018	+·011
21	·115 „ ·055	4·320 „ 4·310		·225 „ ·210	·290 „ ·260	4·225 „ 4·220		·260 „ ·230	·006	..	−·003	−·016	−·010
22	·096 „ ·056	4·330 „ 4·320		·215 „ ·200	·280 „ ·260	4·235 „ 4·230		·265 „ ·230	·002	..	+·006	−·018	−·006
23	·100 „ ·060	4·335 „ 4·325		·215 „ ·202	·280 „ ·260	4·240 „ 4·230		·255 „ ·215	·006	..	−·003	−·013	−·008
24	·110 „ ·068	4·335 „ 4·325		·225 „ ·210	·280 „ ·260	4·240 „ 4·235		·240 „ ·215	·015	..	−·022	−·008	−·015
Ranges,	..	..	..	..	..	..	..	..	·015	·029	−·002	−·015	−·009
Means,	..	..	..	..	..	..	..	..	·000		−·009	−·007	−·008

General Data.	Results.	Symbols.
Depth of water above datum = 9'·99 to 10'·07. Depth at Solani Gauge = 10'·00. Central depth = about 11'·20. Breadth of Water-Surface = 171'·0. Wind, Calm throughout; Canal, Rising; Central Surface Velocity = 4·49. Number of top immersed step, = 4th on both banks. Difference of Level of top immersed steps on either bank = ·196, L > R.	Difference of surface level at edges = ·196 − (h'' − h'). Elevation of water surface at centre above either edge = (H − h) − (C + c); [Elevation shown by + ; Depression by − sign]	H = Reading of Levelling Staff on top immersed step. h = Height of water-surface above top immersed step. C = Reading of Levelling Staff over centre of stream. c = Reading of Continuation-strip of Levelling Staff at centre. [L > R means Left above Right. R > L means Right above Left.]

Digitized by Google

TABLE LXXIX.

SURFACE SLOPE-MEASUREMENTS IN 2000′ AND 4000′ SLOPE-LENGTHS.

The two water-level determinations concerned in each (individual) Surface-Slope Measurement were *strictly simultaneous*. Those required for the 4000′ Slope-Length were taken about 5 minutes after those of the 2000′ Slope-Length (and by the same Observers).

Site.	Solani Right Aqueduct Site, Right Bank.											Embankment.
Date, 1876.	2-6	3-6	5-6	14-6	17-6	18-7	19-7	20-7	21-7	22-7	24-7	5-9
Wind, ...	v *l*	C	C	v *l*	ENE *l*	C	C	C	C	C	C	C
Gauge at Experimental Site, ..	9·54	9·62	10·00	9·96	9·98	7·06	6·87	6·65	7·05	4·30	6·25	7·47
Surface-Fall (in feet) from 2000′ to 1000′ above Site,	·15	·16	·18	·18	·19	·12	·10	·12	·11	·08	·10	·25
Surface-Fall (in feet) in 1000′ above Site, ...	·24	·24	·19	·22	·20	·23	·24	·24	·24	·28	·35	·20
Surface-Fall (in feet) in 1000′ below Site, ...	·15	·13	·18	·16	·19	·25	·22	·22	·22	·38	·19	·22
Surface-Fall (in feet) from 1000′ to 2000′ below Site,	·11	·13	·13	·14	·14	·10	·11	·11	·13	·07	·12	·23
Surface-Slope, in 2000′, ...	195	185	185	190	195	240	230	230	230	330	270	210
Surface-Slope, in 4000′, ...	163	165	170	175	180	175	168	173	175	203	240	225

Solani Embankment, Main Site, Left Bank.

SURFACE-SLOPE-MEASUREMENTS ON BOTH BANKS. TABLE LXXX.

The two water-level determinations concerned in each (individual) Surface-Slope Measurement were *strictly simultaneous*. Those of the Right Bank were made from 2 to 3 hours after those on Left Bank at same Site (and by the same Observers).
The Sub-Column "Variation" shows the Variation of Gauge-Reading in the interval (occupied by Discharge-Measurement).
The Reference Nos. refer to Abstract Tables 29, 30.

Reference No.	Date 1878-9.	Solani Embankment Main Site.								Solani Twin Aqueducts.							
		Depth.		Wind.				Surface-Slope.		Depth.		Wind.				Surface Slope.	
				From		To						From		To			
		Gauge-Reading.	Variation.	Dirn.	Vely.	Dirn.	Vely.	Left Bank.	Right Bank.	Gauge-Reading.	Variation.	Dirn.	Vely.	Dirn.	Vely.	Left Bank.	Right Bank
7	18-12-78	9·88	−·01	S	5	E	7	225	228	..	..	..	..	..	..	..	..
17	14-12-„	..	..	..	..	..	..	..	..	9·99	−·03	NE	4	?	?	183	175
18	19-12-„	9·91	+·04	E	4	E *b* S	8	228	225	·87	−·03	SE	*l*	NE	*l*	190	200
19	20-12-„	·88	−·01	S	3	W	10	228	238	·83	−·02	..	0	SW	12	195	205
20	15-4-79	·43	+·15	W	9	W	25	265	218	·40	+·09	NW	*l*	SW	12	215	200
21	12-4-78	·47	·00	E	8	E	8	205	228	·46	+·16	SE *b* S	7	E	23	198	190
22	28-5-„	·50	−·01	W	7	W	9	243	235	·45	−·06	W	6	V	*l*	205	188
23	27-5-„	·45	−·01	V	*l*	V	*q*	220	233	·39	−·02	SW *b* W	8	SW	13	210	190
24	6-4-„	8·75	·00	W	6	W	6	215	233	8·67	·00	NW	2	NW	3	225	193
25	20-3-„	·53	−·21	SW	*l*	WSW	*l*	199	230	·48	−·25	SW	*l*	WSW	*l*	218	198
26	21-3-„	·24	·00	SE	3	V	*l*	204	232	·18	−·03	SE	3	V	*l*	220	228
27	12-3-„	·05	·00	SE	6	SE	8	200	227	7·99	−·02	SE	6	SE	8	210	195
28	9-3-„	7·63	−·02	..	0	..	0	214	255	·55	·00	..	0	..	0	220	203
29	8-3-„	·61	−·01	W	10	V	*l*	211	241	·52	−·04	SW	9	NW	*l*	223	205
30	11-3-„	·60	−·01	..	0	..	0	218	233	·51	−·01	..	0	..	0	235	205
31	7-3-„	·61	·00	S *b* W	6	W	7	213	238	·50	·00	S	6	S	7	223	213

N.B.—For numerous other Non-simultaneous Surface-Slope Measurements on opposite Banks, (at Fifteenth Mile, Belra, Jaoli, and Kamhera Sites), *see* Detailed Tables XLIX—LV.

SURFACE SLOPE-MEASUREMENTS ON BOTH BANKS. TABLE LXXXI.

Date.	Gauge.	Wind.	Surface-Slope. L. Bank.	Surface-Slope. R. Bank	Solání Embankment Main Site. Remarks.
8-12-76	9·57	Calm.	203	213	The two water-level determinations concerned in each (individual) Surface Slope Measurement were *strictly simultaneous*. Those of the right bank were made about 2 or 3 minutes later than those on the left bank (and by the same Observers).
9-12-„	9·77	Calm.	138	155	

Digitized by Google

SIMULTANEOUS LOCAL SURFACE-SLOPE MEASUREMENTS.

At Fifteenth Mile, and Solání Sites.

[The Slope-measurements on same bank were executed at each of the Sites strictly simultaneously.]
The "Variation of Gauge" entry shows the variation during 2 or 3 hours' Field-work (Discharge-Measurement) done in connexion with these Slope-Measurements.

Reference No.	Date, 1878.	Fifteenth Mile Sites.				Solani Embankment Main Site.				Solani Aqueduct Sites.				Surface-Slope (S) [Simultaneous].			
		Gauge-Reading.	Variation of Gauge.	Wind.		Gauge-Reading.	Variation of Gauge.	Wind.		Gauge-Reading.	Variation of Gauge.	Wind.		Fifteenth Mile.	Solani Embankment	Solani Twin Aqueducts.	Bank.
		h		Direction.	Velocity.	h		Direction.	Velocity.	h		Direction.	Velocity.				
1	18-12	15·21	−·03	W	3	9·95	−·01	S	5	?	..	..	..	215	225	?	L
2	19-12	·16	+·01	..	0	·89	+·04	E	4	9·88	−·01	SE	l	213	228	190	L
3	20-12	?	..	..	..	·88	−·01	S	3	·83	·00	..	0	?	228	195	L
4	29- 5	15·30	+·02	NW	l	10·06	−·07	W	8	No Field-work.		..	..	240	213	No Observations.	L
5	10- 4	14·33	−·01	..	0	9·10	+·02	V	l			..	..	253	215		L
6	8- 4	13·97	−·12	..	0	8·79	+·05	V	l			..	..	228	215		L
7	4- 4	·98	·00	..	0	·79	+·01	W	6			..	..	223	217		L
8	29- 3	·95	·00	N	8	·74	−·02	W	20			..	..	230	205		L
9	14-12		..	..	..	10·01	−·05	E	7	9·98	−·03	NE	4		230	183	L
10	12- 4		..	..	..	9·47	·00	E	8	·35	+·16	SE b S	7		205	198	L
11	„		..	..	..	·47	„	E	8	·51	„	E	23		228	190	R
12	28- 5		..	..	..	·50	−·01	W	7	·48	−·06	W	6		243	205	L
13	„		..	..	..	·49	„	W	9	·42	„	V	l		235	188	R
14	27- 5		..	..	..	·45	−·01	V	l	·40	−·02	SW b W	8		220	210	L
15	„		..	..	..	·44	„	V	g	·38	„	SW	13		233	190	R
16	6- 4		..	..	..	8·75	00	W	6	8·67	·00	NW	2		215	225	L
17	„		..	..	..	·75	„	W	6	·67	„	NW	3		233	193	R
18	20- 3		..	..	..	·63	−·21	SW	l	·60	−·25	SW	l		199	218	L
19	„		..	..	..	·42	„	WSW	l	·35	„	WSW	l		230	198	R
20	21- 3		..	..	..	·24	·00	SE	3	·19	−·03	SE	3		204	220	L
21	„		..	..	..	·24	„	V	l	·16	„	V	l		232	228	R
22	12- 3		..	..	..	·05	·00	SE	6	·00	−·02	SE	6		200	210	L
23	„		..	..	..	·05	„	SE	8	7·98	„	SE	8		227	195	R
24	9- 3		..	..	..	7·64	−·02	..	0	·55	·00	..	0		214	220	L
25	„		..	..	..	·62	„	..	0	·55	„	..	0		255	203	R
26	8- 3		..	..	..	·61	−·01	W	10	·54	−·04	SW	9		211	223	L
27	„		..	..	..	·60	„	V	l	·50	„	NW	l		241	205	R
28	11- 3		..	..	..	·60	−·01	..	0	·51	−·01	..	0		218	235	L
29	„		..	..	..	·59	„	..	0	·50	„	..	0		233	205	R
30	7- 3		..	..	..	·61	·00	S b W	6	·50	·00	S	6		213	223	L
31	„		..	..	..	·61	„	W	7	·50	„	S	7		238	213	R

No Field-work at this Site on these days.

No Observations.

Digitized by Google

TABLES LXXXIII.—LXXXVI.

Silt and Evaporation.

Silt-Densities, -Velocities, and -Discharges, Series 261,262, Table LXXXIII.
Silt-Densities and-Discharges, Roorkee Reach, ... „ LXXXIV.
„ „ „ Belra Reach, ... „ LXXXV.
Evaporation at Solání Aqueduct and Kamhera Sites, „ LXXXVI.

Table LXXXIII. shows two Sets (Series 261, 262) of Silt-Densities on 9 verticals at the Solání Right Aqueduct and Embankment Main Sites. The Table is got up in pattern similar to those of Mean Velocity, (*see* explanation at page 67). No Velocity-work having been done along with the Silt-collections, the "Mean Results" of Mean Velocity Series Nos. 111, 153, 154 have been brought forward for comparison of Mean Velocity with Silt-Density on same vertical, and for computation of Silt-Velocities (s) and Silt-Discharges (S).

Tables LXXXIV., LXXXV. show the details of Silt-Collections made on centre vertical, and of those on various verticals forming Series 261, 262 above, with the Silt-Densities and Silt-Discharges corresponding. Except in Series 261, 262 the Silt-Discharges (S) are only roughly approximate, being merely the products of the Central Silt-Densities (σ_o) by the Cubic Discharges.

No velocity-work was done along with the Silt-Collections of Table LXXXIV. so that the Cubic Discharges quoted are only interpolations from Tables XXXIV. to XL. The Silt-Collections of Table LXXXV. were made either before or after the velocity-work of Tables L., LI., so that the Cubic Discharges quoted are actual measurements.

The Quantity of water collected, and the Quantity *expected* (computed from the depth of water, H) are shown for every Silt-collection in Table LXXXIV. The Difference (or "Loss") shows roughly the difficulty of handling the Silt-Tube, (some "Loss" being of course allowed for the spring-bottom shutting before the Tube touched the Bed). On the rough bed of the Solání Embankment the "Quantity expected" is somewhat conjectural, being computed from the Average Depths, whilst the Silt-Tube was liable to close on touching any roughness on the Bed.

[In the above Tables the Silt-Density (σ) means the Density of aggregation of the Silt in the water, and is formed as the quotient—

"Quantity of Silt collected ÷ quantity of water in which it was contained,"

and is measured in grains per cubic foot].

Table LXXXVI. shows the quantity (depth in inches) of Evaporation from the Canal Surface from 1876 to 1879 at the Solání Aqueduct, and from January to March 1879 at the Kamhera Site. Various meteorological data affecting evaporation, (such as Mean Temperature, Mean Humidity, Average Wind,) are given for the Solání Experiments.

Digitized by Google

SILT-DENSITIES, -VELOCITIES AND -DISCHARGES.

No. 261 at Solání Right Aqueduct; No. 262 at Solání Embankment, Main Site.

[Instrument—12′ × 2″ × 2″ Silt-Tube].

No velocity-work was done along with these Silt-collections. The "Mean Results" of Mean Velocity Series Nos. 111, 153, 154 have been brought forward for computation of Silt-Velocities and -Discharges.

Solani Sites.	Serial No.	1 Date, 1877.	2 Depth. Above Datum. h	Central. H	Solání Aqueduct Gauge.	Hyd. Mean. R	Surface-Breadth. b	Area. A	6 Mean Velocities (u), Silt-Densities (σ), and Silt-Velocities (s), past each vertical. [N.B.—σ is measured in grains per cubic foot, and s in grains per second]. Description of line.	Left of centre. 42½	40	30	20	10	Centre.	Right of centre. 10	20	30	39½	42½	7 Cubic and Silt Discharge in c.ft., and lbs. per sec. D, S	8 Mean Velocity, Mean Silt Density, Mean Silt Velocity. V, σ̄, s̄
Right Aqueduct.	111	16 Sets	8·97	8·97	8·97	7·42	83·7	760·1	Rod-Velocities, (u),	?0	3·65	4·02	4·00	4·04	4·03	4·05	3·99	3·94	?3·43	?0	c. ft. 2,956	V = 3·88
	261	22-6-77	9·00	9·00	9·00	7·44	83·6	762·6	Silt-Densities, (σ).	?	98·9	82·8	99·9	85·4	?40·4	94·7	99·9	87·7	87·8	?	..	σ̄ = 86·3
									Silt-Velocities, (s),	?0	361	333	400	345	?163	384	399	346	?301	?0	lbs. 36·6	s̄ = 335

Embkt. Main Site.		Date.	h	H		R	b	A	Description of line.	Left of centre. Edge	74½	60	40	20	Centre.	Right of centre. 20	40	60	74½	Edge	D, S	V, σ̄, s̄
	154 6 Sets 153 5 Sets		9·30	10·46	9·21	8·82	167·9	1651·1	Rod-Velocities, (u),	?0	2·78	3·54	3·81	3·92	3·87	3·93	3·94	3·58	2·84	?0	c. ft. 6,049	V = 3·66
	262	19-7-77	9·26	10.44	9·10	8·73	168·7	1644·3	Silt-Densities, (σ).	?	359	378	349	347	376	436	383	354	324	?	..	σ̄ = 370
									Silt-Velocities, (s),	?0	998	1,338	1,330	1,360	1,455	1,713	1,509	1,267	920	?0	lbs. 317·6	s̄ = 1,352

Digitized by Google

TABLE LXXXIV.

SILT-DENSITIES AND -DISCHARGES.

At Solání Twin Aqueduct and Embankment Main Sites.

[*Instrument*—12′ *Silt-Tube*, 2″ *diam.*]

The Silt-Discharges (S) Nos. 1 to 24 are only rough approximations, see Explanation, page 152.

Sites.	Reference No.	Date, 1876-7-8.	Position of vertical.	Depth at Gauge. h	Depth on vertical of Experiment. H	Quantity of water in Tube corresponding to depth. c. in.	Quantity of water in Tube actually collected. c. in	Quantity of water in Tube Loss. c. in.	Silt. Actual [in grains.]	Silt. Density [in grs. per c. ft.] σ_o	Cubic Discharge Approximate. D	Silt Discharge [Approx. in lbs. per sec.] S	Mean Velocity. V
Solani Left Aqueduct.	1	16-12-'76	Central.	10·00	10·00	754·3	588·7	165·6	6·6	19·4	3,497	9·7	4·14
	2	21-12- „		·00	·00	754·3	650·7	103·6	15·7	41·8	3,497	20·9	4·14
	3	6-1-'77		9·60	9·60	724·1	675·2	48·9	22·9	58·8	3,218	27·0	3·96
	4	24-2- „		8·05	8·05	607·2	567·1	40·1	10·2	31·3	2,373	10·6	3·48
	5	8-3- „		·30	·30	313·0	285·1	27·9	1·5	9·4	2,473	3·8	3·51
	6	17-3- „		·10	·10	305·5	245·7	59·8	4·3	30·5	2,393	10·4	3·48
	7	9-5- „		·75	·75	330·0	305·9	24·1	6·5	36·8	2,653	13·9	3·58
Solani Right Aqueduct.	8	17-4-'77	Central.	8·59	8·59	324·0	308·5	15·5	2·5	13·9	2,722	5·4	3·73
	9	28-4- „		9·48	9·48	357·5	346·6	10·9	4·9	24·7	3,140	11·1	3·91
	10	15-5- „		·63	·63	363·2	344·9	18·3	5·2	26·4	3,240	12·2	3·98
	11	22-5- „		·62	·62	362·8	351·8	11·0	5·2	25·9	3,235	12·0	3·97
	12	30-5- „		10·00	10·00	377·1	362·6	14·5	6·7	31·9	3,401	15·5	4·02
	13	22-6- „		9·00	9·00	339·4	318·0	21·4	7·4	40·4	2,949	17·0	3·87
	14	22-8- „		·68	·68	365·1	350·9	14·2	56·8	280·4	3,262	130·5	3·98
	15	15-9- „		10·00	10·00	377·1	358·7	18·4	35·0	169·1	3,401	82·1	4·02
	16	22-9- „	Central.	10·00	10·00	377·1	360·5	16·6	24·3	117·0	3,401	56·9	4·02
	17	29-9- „		·02	·02	377·9	368·3	9·6	23·5	110·8	3,410	54·1	4·03
	18	6-10- „		·00	·00	377·1	352·7	24·4	13·4	65·9	3,401	32·0	4·02
	19	13-10- „		5·82	5·82	219·5	218·4	1·1	5·4	42·7	1,624	9·9	3·29
	20	20-10- „		3·80	3·80	143·3	129·5	13·8	·4	5·1	842	·6	2·62
	21	27-10- „		4·60	4·60	173·5	159·4	14·1	·2	·3	1,162	·0	2·98
	22	18-11- „		8·97	8·97	338·3	323·2	15·1	7·1	38·1	2,941	16·0	3·86
	23	15-12- „		6·50	6·50	245·1	231·4	13·7	4·5	33·7	2,010	9·7	3·65
	24	16-1-'78		·68	·68	251·9	222·3	29·6	52·1	404·7	2,041	118·3	3·59
	25	22-6-'77	40 L	9·00	9·00	339·4	299·8	39·6	17·1	98·9			
	26	„ „	30 L	„	„	„	315·4	24·0	15·1	82·8			
	27	„ „	20 L	„	„	„	313·7	25·7	18·1	99·9			
	28	„ „	10 L	„	„	„	324·9	14·5	16·0	85·4			
	29	„ „	C	„	„	„	318·0	21·4	17·4	40·4	2,956	36·6	3·88
	30	„ „	10 R	„	„	„	324·9	14·5	17·8	94·7			
	31	„ „	20 R	„	„	„	322·3	17·1	18·6	99·9			
	32	„ „	30 R	„	„	„	324·9	14·5	16·4	87·7			
	33	„ „	40 R	„	„	„	324·5	14·9	16·4	87·8			
Solani Embankment Main Site.	34	19-7-'77	75 L	9·26	9·64	?363·6	351·8	?11·8	72·8	359			
	35	„ „	60 L	„	10·20	?384·7	375·2	?9·5	81·8	378			
	36	„ „	40 L	„	·68	?402·8	417·7 +	?14·9	84·2	349			
	37	„ „	20 L	„	·64	?401·3	392·5	?8·8	78·6	347			
	38	„ „	C	„	·44	?393·7	367·4	?26·3	79·8	376	?6,049	317·6	3·66
	39	„ „	20 R	„	11·00	?414·9	373·5	?41·4	94·0	436			
	40	„ „	40 R	„	·21	?422·8	376·1	?46·7	83·1	383			
	41	„ „	60 R	„	10·90	?411·1	382·0	?28·1	78·3	354			
	42	„ „	75 R	„	9·92	?373·1	357·9	?15·2	66·9	324			

Digitized by Google

TABLE LXXXV.

SILT-DENSITIES AND -DISCHARGES.

Belra Site.

[Instrument—12′ Silt-Tube, 2″ diameter].

These Silt-Collections were made just before or after the velocity-work detailed in Tables L., LI.

The Silt-Discharge (S) is simply the product $\sigma_0 . D$, (reduced to lbs. per sec.)

Serial No.	Date, 1879.	Depth at Gauge. h	Depth Central. H	Water collected. c. in.	Silt. Actual [in grains.]	Silt. Density [in grs. per c. ft.] σ_0	Cubic Discharge [in cub. ft. per sec.] D	Silt Discharge [Approximate in lbs. per sec.] S	Mean Velocity. V
201.	27-3	7·54	9·89	329·3	16·4	86	5,432	66·7	3·00
	9-1	·50	·63	318·4	13·0	71	5,751	58·4	3·24
	11-1	·44	·57	353·5	19·1	93	5,765	76·6	3·27
	17-3	·29	·48	342·3	201·8	1,025	5,367	786·2	3·06
Range,		·25	·41	35·1	188·8	954	384	727·8	·27
Means of 4,		7·44	9·64	335·9	62·6	319	5,579	247·0	3·14
202.	18-3	7·20	9·39	328·0	13·8	73	5,324	55·6	3·06
	17-1	·04	·23	300·7	515·1	2,981	5,431	2313·3	3·22
	21-1	·03	·69	324·0	124·0	668	5,364	511·7	3·13
	22-1	·01	·67	295·0	10·6	63	5,309	47·8	3·11
	24-2	6·98	·21	352·2	32·6	161	5,149	118·5	3·03
	23-1	·98	·64	328·0	24·3	129	5,425	100·0	3·19
	,,	·94	·60	,,	,,	,,	5,301	97·7	3·13
Range,		·26	·48	57·2	504·5	2,918	282	2265·5	·19
Means of 7,		7·03	9·49	322·3	106·4	600	5,329	463·5	3·12
204.	13-3	6·67	8·90	342·3	26·5	134	4,900	93·8	3·03
	21-3	·53	·72	305·0	9·7	55	4,815	37·8	2·98
	18-2	·53	·72	291·6	144·3	859	4,941	606·5	3·08
	27-2	·51	·74	299·8	16·9	144	4,762	97·9	2·96
	22-3	·51	·70	283·8	108·7	666	4,781	454·9	2·97
	17-2	·50	·69	299·8	16·9	98	4,718	66·1	2·95
	27-2	·49	·72	332·7	27·7	144	4,796	98·6	2·99
	20-2	·49	·68	320·6	19·4	105	4,777	71·6	2·99
	24-3	·45	·80	290·7	50·1	298	4,725	201·2	2·94
	28-1	·44	·76	287·2	209·4	1,258	4,934	886·9	3·14
	28-2	·43	·66	306·3	14·7	84	4,786	57·5	3·00
	21-2	·42	·61	320·6	54·4	293	4,769	199·5	3·01
	6-2	·41	·67	278·2	9·7	60	4,801	41·2	3·04
	22-2	·41	·60	312·4	10·7	59	4,830	40·7	3·05
Range,		·26	·30	64·1	199·7	1,203	223	849·1	·20
Means of 14,		6·49	8·71	305·1	51·4	304	4,810	211·0	3·01
203.	25-3	6·90	9·25	327·1	15·3	81	5,193	60·1	3·07
	20-3	·86	·05	330·6	23·6	124	5,174	91·7	3·09
	15-3	·83	·06	318·9	16·6	90	5,109	65·7	3·11
	16-1	·79	8·98	308·9	60·7	342	5,259	256·8	3·20
	25-2	·79	9·02	325·8	194·2	1,029	5,083	747·1	3·06
	14-3	·78	·01	320·6	183·2	986	4,753	669·5	2·91
	25-1	·76	·42	294·2	18·3	108	5,311	81·2	3·20
	25-2	·75	8·98	325·8	194·2	1,029	4,984	732·6	3·01
	27-1	·70	9·02	296·8	25·6	138	5,142	101·4	3·17
Range,		·20	·27	36·4	178·9	948	558	687·0	·29
Means of 9,		6·80	9·09	316·5	81·2	436	5,112	311·8	3·09
205.	7-2	6·37	8·63	337·9	47·1	241	4,791	164·8	3·05
	30-1	·33	·65	238·7	9·1	66	4,745	44·7	3·06
	8-2	·32	·58	295·9	16·4	96	4,826	66·1	3·09
	4-2	·28	·54	243·1	79·1	561	4,791	383·7	3·08
	10-2	·27	·51	330·1	20·6	108	4,724	72·9	3·05
	31-1	·21	·53	297·6	23·8	139	4,718	93·7	3·08
Range,		·16	·14	99·2	70·0	495	108	339·0	·04
Means of 6,		6·30	8·57	290·6	32·7	202	4,766	137·7	3·07
206.	3-2	6·02	8·28	308·5	16·7	99	4,582	64·8	3·04
	7-3	5·94	·23	313·7	25·0	138	4,284	84·5	2·87
	8-3	·92	·21	292·9	887·5	5,233	4,288	3207·8	2·88
	6-3	·91	·20	283·4	9·4	58	4,330	35·9	2·91
	11-2	·88	·12	267·3	125·7	818	4,415	516·2	3·00
	3-3	·86	·15	274·7	12·8	81	4,121	47·7	2·79
	13-2	·82	·06	275·6	15·8	99	4,481	63·4	3·06
	4-3	·82	·11	284·2	20·9	127	4,361	79·1	2·97
	11-3	·75	7·98	282·9	7·7	48	4,166	28·6	2·89
	14-2	·74	·98	291·1	28·7	171	4,248	103·8	2·94
	10-3	·74	·97	305·4	21·5	123	4,064	71·5	2·82
	15-2	·72	·96	270·8	34·3	219	4,160	130·1	2·88
Range,		·30	·32	46·4	879·8	5,185	518	3179·2	·27
Means of 12,		5·84	8·10	287·5	100·5	601	4,292	369·5	2·92

Digitized by Google

TABLE LXXXVI.

EVAPORATION FROM GANGES CANAL.

Roorkee and Kamhera Reaches.

[*Instrument*—12″ × 12″ *Evapometer*].

[Time is reckoned from midnight right through the 24 hours.]

† The Thomason C. E. College is about one mile from the Solání Aqueduct Site.

Sites.	Experiment No.	Duration of Experiment. From Date, 1876-79.	From Hour.	To Date, 1876-79.	To Hour.	Total in days.	At Thomason C. E. College,† Roorkee. Mean Temperature. Fahr.	Mean Humidity. Saturation = 100	Wind. Prevailing Direction [Approximate].	Wind. Total [in miles per day].	At the Experimental Site. Temperature of water. Initial. Fahr.	Temperature of water. Maximum. Fahr.	Rainfall [affecting the Expert]. Inch.	Evaporation (corrected for rain). Total. Inch.	Evaporation (corrected for rain). Mean per day. Inch.
Solani Aqueduct. At Tail of Central Pier.	1	28-11-76	8·30	7-12-76	8·30	9·0	56·9	57·0	W	58·5	Not observed.	Not observed.	None.	1·26	·14
	2	7-12-„	8·45	14-12-„	10·0	7·1	57·0	54·5	NW	35·7				·72	·10
	3	14-12-„	10·15	21-12-„	12·15	7·1	55·2	61·0	SE	33·6				·65	·09
		Pan broke away and lost.					..	..	..	..				..	..
	4	24-2-77	10·0	3-3-77	11·0	7·0	62·8	49·0	NW	84·0				·96	·14
	5	3-3-„	11·0	10-3-„	10·20	7·0	68·8	44·0	SE	50·8				·43	·06
	6	21-3-„	6·5	29-3-„	9·45	8·2	68·6	46·5	NW	54·8				·97	·12
	7	15-5-„	7·30	22-5-„	7·30	7·0	85·9	25·0	NW	73·1				1·02	·15
	8	19-6-„	5.15	26-6-„	7.30	7·1	94·9	23·5	NW	84·3		65°		·84	·12
		Rainy Season.					..	..	..	..	..	..	..	..	..
	9	13-10-77	8.10	20-10-77	7.15	7·0	78·3	41·5	S	48·4				1·02	·15
	10	2-11-„	9·30	12-11-„	9·30	10·0	71·5	41·0	SE	35·8				1·27	·13
	11	12-11-„	9·40	21-11-„	10·0	9·0	69·9	41·5	SE	34·5				1·20	·13
	12	26-11-„	1·0	7-12-„	9·30	10·9	61·7	52·5	NW	50·1				1·20	·11
	13	19-12-„	3·0	28-12-„	12·0	9·0	61·3	79·5	NW	60·8				+·06	+·01
	14	14-1-78	12·0	24-1-78	15·0	10·1	56·4	68·0	NW	35·0				·48	·05
	15	28-1-„	10·0	2-2-„	14·0	5·2	54·1	70·5	NW	52·1				·38	·07
	16	5-3-„	8·30	12-3-„	9·30	7·0	65·7	37·5	NW	60·8				1·20	·11
	17	20-3-„	9·30	26-3-„	8·30	6·0	75·3	36·5	NW	31·6				·80	·13
	18	26-3-„	8·40	2-4-„	8·15	7·0	80·5	27·5	NW	85·3				·94	·13
	19	5-4-„	7·30	11-4-„	7·0	6·0	79·9	20·0	SE	42·2				1·72	·29
	20	15-4-„	8·0	25-4-„	7·0	10·0	79·4	39·5	SE	40·1	62½°	?	·005	1·27	·13
	21	6-6-„	7·0	17-6-„	6·15	11·0	95·8	18·5	NW	94·2	67°	75½°	None.	1·32	·12
		Rainy Season.					..	..	..	..	..	..	..	..	..
	22	22-10-78	7.15	4-11-78	10·30	13·1	65·8	39·5	NW	46·1	63°	66°		·64	·05
	23	4-11-„	10·30	20-11-„	12.0	16·1	65·8	34·5	NW	46.1	61°	64°	None.	2·50	·16
	24	22-11-„	12·0	29-11-„	12·30	7·0	63·4	45·5	SE	28·6	56½°	62°		·45	·06
	25	29-11-„	12·30	3-12-„	12·12	4·0	66·5	52·0	SE	58·9	57°	?	·23	·45	·11
	26	3-12-„	13·30	14-12-„	15·0	11·1	60·8	50·5	NW	38·8	?	?		·98	·09
	27	14-12-„	15·10	25-12-„	13·0	10·9	55·2	40·5	SE	38·2	?	?	None.	1·12	·10
	28	10-4-79	7·0	28-4-79	7·0	18·0	84·5	13·5	NW	62·5	?	?		2·95	·16
Kamhera Site About 50′ below Experl. Site.	29	6-1-79	16·0	13-1-79	13·0	6·9	No Meteorological Observatory near this Site, which is 33 miles from Roorkee, *see* Plate III.				Not observed.	Not observed.	Evapometer placed under shelter during rain.	·45	·07
	30	18-1-„	13·0	18-1-„	14·0	5·0								·57	·11
	31	18-1-„	14·0	25-1-„	10·20	6·8								1·07	·15
	32	25-1-„	10·30	4-2-„	15·0	10·2								1·93	·19
	33	4-2-„	15·0	11-2-„	15·0	7·0								1·25	·18
	34	11-2-„	15·0	15-2-„	16·0	4·0								·85	·21
	35	15-2-„	16·0	25-2-„	15·0	10·0								·35	·04
	36	25-2-„	15·0	4-3-„	12·0	6·9								1·45	·21
	37	4-3-„	12·0	11-3-„	12·0	7·0								1·60	·23
	38	11-3-„	12·0	18-3-„	11·0	7·0								·60	·09
	39	18-3-„	11·0	25-3-„	12·0	7·0								2·60	·37
	40	25-3-„	11·30	27-3-„	11·30	2·0								·45	·23

Digitized by Google

PART II.

ABSTRACT TABLES.

TABLES 1—34.

Digitized by Google

Digitized by Google

PART II.—ABSTRACT TABLES.

Tables 1—34.

These Tables contain an Abstract of the principal Results (chiefly "Means" and "Ranges") from the Detailed Tables (VII.—LXX.) preceding, together with additional Results (mostly computed, not experimental details). They bear separate numbering in black letter Arabic numerals (1—34), and separate pagination. A Table of Contents follows.

Reference to these Abstract Tables will be sufficient for most purposes, and so save reference to the Detailed Tables.

Digitized by Google

ABSTRACT TABLES,—CONTENTS.

Table.	Page.	TITLE, &c.
1	8	Effect of Control on Surface-Fall.
2	4, 5	Double-Floats of Modern Experiments.
3, 4	6–9	Vertical Velocity-Curves—Abstract of Results.
3, 4	6–8	——— Central Verticals, Series 1-28.
4	9	——— Non-Central Verticals, „ 29-46.
5	10	Most Probable Parabola. Coeff. of A, B, C; of v_x in L, M, N; of L, M, N;
„	„	——— Weights and Square Roots of Weights of A^1, B, C.
6	11	Depression of Maximum Velocity Line, Central Vertical, Series 1-28.
7	12	Parameter-Variation, Central Vertical Velocity-Parabolæ, „ „ „
8	13	Mean Velocity past Central Vertical, Variation, „ „ „
9	14	Rod-Motion, Comparison i. Solání Twin Aqueducts, Central Vertical.
10	15	Effect of Depth on Velocity. Velocities over top steps of Sólání Embankment.
11	16, 17	Transverse Velocity-Curves. Float-Course Spacings and Area and Discharge-Formulæ.
12	18	Mean Velocity-Curves at same water-level. Similar velocity-ordinates proportional.
13	19	Surface, Mid-depth, and Bed Velocity-Curves—Abstract of Results, Series 51-66.
14-18	20–24	Mean Velocity-Curves. Abstract of Results.
14	20	——— Series 101-107; 131-139; 231-238.
15	21	——— „ 108-127.
16, 17	22, 23	——— „ 151-181; 191-197.
18	24	——— „ 201-206; 211-217; 221-225.
19	25	Trial Transverse Curves. Parabolic, Elliptic, Exponential.
20-22	26–31	Central Surface and Mean Velocities—Abstract of Results.
20	26, 27	——— Series 101-107; 108-127; 131-139.
21	28, 29	——— „ 151-181.
22	30, 31	——— „ 191-197; 201-206; 211-217; 221-225.
23	32	Cubic Discharge Table. Roorkee, Belra, and Kamhera Reaches; and 4 Distributaries.
24-31	33–45	Cubic Discharge Verification.
24	33	——— Range of Mean Velocities in each Series. Series 101-238.
25	34, 35	——— Cases of High Mean Velocity Range (over 10 per cent.) in a Series.
26	36, 37	——— Range of Mean Velocity-Measurements of same Day, at same Site.
27	38, 39	——— Details of cases over 10 %, over 5 %, and over 3 % Discrepancy in ditto.
28	40	——— Non-Simultaneous Discharge-Measurements of same Reach, Nos. 1—6.
29, 30	41–43	——— Simultaneous Discharge-Measurements of same Reach.
29	41	——— „ „ „ Comparison Nos. 7—16.
30	42, 43	——— „ „ „ „ „ 17—31.
„	43	——— „ „ „ at three Sites.
31	44, 45	——— Discharge-Measurements in different Reaches.
„	44	——— „ „ at same time—Comparison Nos. 32—41.
„	45	——— „ „ in same water— „ „ 42—75.
32	46, 47	Range of Conditions and Results, (Series 1-238).
33	48	Specimen Field Book.
34	49	Specimen Computation of Cubic Discharge.

Digitized by Google

EFFECT OF CONTROL ON SURFACE-FALL.

This Table is an Abstract of the Results required for Plates VIII, IX, together with additional data.

Sites.		Serial No.	Number of Sets.	Control. Head of Reach. Gates open in Dam.	Ogees open in Dam.	Gates closed in Regulator.	Tail of Reach. Withdrawn by Distributaries. Q	Average Obstruction. h	Gauge-Readings. Head-Gauge of Reach.	Experimental Sites. 15th Mile.	Embankment, Main Site.	Solani Aqueduct.	Jaoli Site.	Tail-Gauge of Reach.	Surface-Fall. Sub-Reaches. Upper Sub-Reach. F_1	Middle Sub-Reach. F_2	Lower Sub-Reach. F_3	Whole Reach. F	Surface-Slope. S	[Bank].
Solani Aqueducts.	Left.	106	6	0	½	0	23	·00	7·30	Not observed.		8·02	Not observed.	3·55	5·88	No middle Sub-Reach.	4·27	10·15	?206	Left.
	Right. [Left Aqueduct open].	112	18	0	0	0	116	·00	7·82			8·58		3·67	5·85		4·71	10·56	?	
		113	1	0	0	0	0	·00	7·40			8·16		3·60	5·84		4·36	10·20	228	
		116	7	0	0	0	41	·13	6·84			7·49		3·51	5·95		3·79	9·74	?207	
		120	9	0	0	0	144	1·04	5·07			5·78		3·38	5·89		2·20	8·09	?	Right.
		125	1	3	0	10	0	·00	3·20			2·02		1·40	7·78		·42	8·20	203	
		127	1	16	0	10	0	·50	1·50			·70		?·50	7·40		?·00	?7·40	113	
	[L. Aq. closed].	131	2	0	0	0	247	?4·30	1·60			4·60		4·30	3·60		·10	3·70	025	
		133	1	0	0	0	162	3·08	1·35			3·60		3·40	4·35		·00	4·35	?	
		136	1	0	0	8	71	1·33	2·80			3·12		2·30	6·28		·62	6·90	208	Right.
		139	2	0	0	8	50	1·24	2·00			2·66		2·30	5·95		·16	6·11	151	
Solani Embankment, Main Site.	High Water.	22	16	1/16	0	0	24	·33	5·97	Not observed.	6·76	6·55	Not observed.	3·30	4·64	1·38	3·05	9·07	?	
	Low Water.	151	5	0	0	0	268	·00	9·21		9·94	9·87		4·21	4·70	1·25	5·46	11·41	227	
		154	5	0	0	0	243	·00	8·36		9·08	8·94		3·91	4·71	1·32	4·83	10·86	?229	
		155	6	0	0	0	104	·00	8·03		8·74	8·65		3·81	4·72	1·26	4·65	10·63	217	Left.
		160	6	0	0	0	18	·00	6·29		7·06	6·91		3·20	4·67	1·32	3·52	9·51	214	
		161	11	0	0	0	16	·00	6·07		6·82	6·72		3·13	4·68	1·27	3·39	9·34	?217	
		164	1	0	0	0	0	·67	5·10		5·24	?4·69		2·00	5·29	1·72	2·49	9·50	?	
		168	1	0	0	0	147	2·67	3·00		3·98	4·50		3·70	4·45	·65	·60	5·70	?	
		171	3	0	0	0	258	?4·30	1·83		3·62	4·55		4·30	3·65	·24	·05	3·94	?038	
		172	2	0	0	0	246	?4·30	1·55		3·58	4·55		4·30	3·41	·20	·05	3·66	?	
		173	5	0	0	8	232	2·08	2·33		3·47	4·23		3·95	4·29	·41	·09	4·79	088	
		176	2	4½	0	8	104	1·76	2·43		2·83	3·30		2·80	5·03	·70	·30	6·03	?242	Left.
		178	2	0	0	0	82	2·67	1·35		2·43	3·28		2·90	4·36	·32	·18	4·86	?	
		180	2	0	0	9	19	1·24	1·80		1·67	2·30		2·00	5·72	·39	·10	6·21	148	
		181	1	13	0	10	0	·67	2·50		·35	·93		?·67	7·58	·59	?·06	?8·23	090	
15th Mile.	Old Site.	191	1	0	0	0	123	·00	9·30	15·31	Not observed.	9·99	Not observed.	4·25	2·28	3·63	5·54	11·45	240	
		192	6	0	0	0	44	·00	8·29	14·32		8·98		3·92	2·26	3·65	4·87	10·78	231	
		193	3	0	0	0	80	·00	8·00	13·99		8·70		3·77	2·30	3·60	4·73	10·63	227	Left.
		194	2	0	0	0	0	·00	7·58	13·60		8·25		3·65	2·27	3·66	4·40	10·33	231	
		195	1	0	0	0	62	·00	6·30	12·53		7·05		3·20	2·06	3·79	3·65	9·50	?	
	New Site.	196	3	0	0	0	268	·00	9·13	15·16		9·83		4·20	2·26	3·65	5·37	11·28	?221	
		197	1	0	0	?	115	·00	8·60	14·69		9·35		3·95	2·19	3·66	5·20	11·05	220	Both.
Jaoli.		211	9	No Dam in this Reach.		No Bays closed.	53	?·00	6·35	Not required.	Not required.	Not required.	7·21	?3·35	·39	No middle Sub-Reach.	?5·49	5·88	?174	
		212	6				43	·00	5·79				6·71	3·23	·32		5·14	5·46	160	
		213	7				52	·29	5·50				6·45	3·30	·29		4·80	5·09	?148	
		214	8				35	·00	5·25				6·21	3·16	·28		4·70	4·98	146	
		215	10				47	·20	4·98				5·97	3·09	·25		4·53	4·78	145	Both.
		216	9				44	·44	4·67				5·64	3·09	·27		4·19	4·46	144	
		217	6				16	·67	4·33				5·36	3·25	·21		3·76	3·97	140	

Digitized by Google

DOUBLE-FLOATS OF

Experiments.	Reference to original. Page.	Double-Float. Name of part.	Description.	Maximum Immersion.
Mississippi, 1851-53. *Chief of Engineers' Report for 1875.	224	Surf.-Float, ..	Square slice of cork, 8″ × 8″ × 3″, ...	1½″
	224	Connector { 1°	Cord $\frac{3}{10}$″ thick, (in original Edition), ...	100′
	114*	Connector { 2°	Cord $\frac{1}{10}$″ thick, (correction* by Col. Forshey),..	100′
	224	Sub-Float, ..	Keg, 15″ × 10″ diam., (ends removed,).. ..	..
Mississippi, 1858 (under 5′ depth).	224	Surf.-Float { 1°	Light pine, 5½″ × 5½″ × ½″, ...	?½″
		{ 2°	Hollow tin ellipsoid, 5½″ × 1½″,..	?½″
	,,	Connector, ..	Cord $\frac{1}{10}$″ thick, ...	5′
	,,	Sub-Float, ..	Paint keg, 9″ × 6″ diam., (ends removed), ..	..
Mississippi, 1858 (over 5′ depth).	224	Surf.-Float { 1°	Light pine, 5½″ × 5½″ × ½″, ...	?½″
		{ 2°	Hollow tin ellipsoid, 5½″ × 1½″,..	?½″
	,,	Connector, ..	Cord < $\frac{3}{10}$″ thick, ...	70′
	,,	Sub-Float, ..	Keg, 12″ × 8″ diam., (ends removed,)	..
Mississippi, 1859.	252	Surf.-Float, ..	Cork disc, 2″ diam. × ½″, ...	½″
	,,	Connector, ..	Fine wire, (size not stated), ...	6′
	,,	Sub-Float, ..	Cross (+) of 4 strips of tin 4″ × 2″ on edge, with cork disc 2″ diam. × ½″, ...	..
Connecticut 1871-74.	48	Surf-Float, ..	Hollow tin ellipsoid, 6″ × 1½″, ...	?½″
	,,	Connector, ..	Cord, ·036″ thick, ...	22′
	,,	Sub-Float, ..	Hollow cylindric annulus 8½″ × 8½″ and 7½″ diam., of sheet tin, with 28 oz. lead, ..	..
Irrawaddi, 1872.	16 & 17	Surf.-Float, ..	Light wood disc, 6″ diam. × 1″,..	¾″
		Connector, ..	Cord, $\frac{1}{10}$″ thick, varnished, ...	70′
		Sub-Float, ..	Wood-cylinder, 12″ × 6″ diam., loaded below,..	..
Roorkee, 1875. * Report of 1874-5.	54*	Surf.-Float, ..	Cork disc, 1″ diam. × ½″, ...	½″
	,,	Connector, ..	Black silk thread, about $\frac{1}{10}$″ thick, ...	6′
	,,	Sub-Float, ..	Cross (+) of 2 sheets tin discs 3″ diam., on edge with cork disc 1″ diam. × ½″ thick,	..
Roorkee, 1875-6.	Chapter on Double-Floats.	Surf.-Float, ..	Pine disc, 3″ diam. × ½″,..	½″
		Connector, ..	Brass wire No. 30 B.W.G. = ·012″ thick, ..	10′
		Sub-Float, ..	Heavy wood ball 3″ diam., loaded, ...	..
Roorkee, 1876-79.		Surf.-Float, ..	Cork disc, 1″ diam. × ½″, ...	$\frac{3}{10}$″
		Connector { 1°	Black silk thread, $\frac{1}{120}$″ thick, (in 1876-78), ..	10′
		{ 2°	Black silk thread, $\frac{1}{80}$″ thick, (from May '78 only a few cases), ...	10′
		Sub-Float, ..	Hollow shell of thin sheet copper, 1½″ diam., loaded below, ...	..

Digitized by Google

MODERN EXPERIMENTS.

Weight.	Reserve Buoyancy.	Tension of Connector.	Area of Surfaces in square inches: exposed to direct current-pressure.	Area of Surfaces in square inches: exposed to lateral current-adhesion.	Relative Surface. [Sub-Float=1]. Direct.	Relative Surface. [Sub-Float=1]. Lateral.
?	?	..	$(8'' \times \sqrt{2}) \times 1{\cdot}5'' .. = 17$	$2 \times 17 + 8'' \times 8'' .. .. = 98$	·11	·33
?	..	?	$\frac{8}{10}'' \times (100 \times 12)'' .. = 240$	$2 \times 240 .. .. .. = 480$	1·60	1·60
8·1 oz.	..	?	$\frac{1}{10}'' \times (100 \times 12)'' .. = 120$	$2 \times 120 .. .. .. = 240$	·80	·80
130 oz.	..	..	$15'' \times 10'' .. .. = 150$	$2 \times 150 +$? (for edges) $= 300+$	1	1
?	?	..	$(5{\cdot}5'' \times \sqrt{2}) \times \frac{8}{8}'' .. = 2{\cdot}92$	$2 \times 2{\cdot}92 + 5{\cdot}5'' \times 5{\cdot}5'' .. = 36{\cdot}1$	·05	·33
?	?	..	$\frac{1}{4} \times \frac{1}{4}\pi \times 5{\cdot}5'' \times 1{\cdot}5'' = 3{\cdot}25$	$2 \times 3{\cdot}25 + \frac{1}{4}\pi \times 5{\cdot}5'' \times 5{\cdot}5'' = 30{\cdot}3$	·06	·28
?	..	?	$\frac{1}{10}'' \times (5 \times 12)'' .. = 6$	$2 \times 6 .. .. .. = 12$	·11	·11
?	..	..	$9'' \times 6'' .. .. = 54$	$2 \times 54 +$? (for edges) $.. = 108+$	1	1
?	?	..	$(5{\cdot}5'' \times \sqrt{2}) \times \frac{8}{8}'' .. = 2{\cdot}92$	$2 \times 2{\cdot}92 + 5{\cdot}5'' \times 5{\cdot}5'' .. = 36{\cdot}1$	·03	·19
?	?	..	$\frac{3}{4} \times \frac{1}{4}\pi \times 5{\cdot}5'' \times 1{\cdot}5'' = 3{\cdot}25$	$2 \times 3{\cdot}25 + \frac{1}{4}\pi \times 5{\cdot}5'' \times 5{\cdot}5'' = 30{\cdot}3$	·03	·16
?	..	?	$\frac{8}{10}'' \times (70 \times 12)'' .. = 168$	$2 \times 168 .. .. .. = 336$	1·75	1·75
?	..	..	$12'' \times 8'' .. .. = 96$	$2 \times 96 +$? (for edges) $.. = 192+$	1	1
?	?	..	$2'' \times \frac{1}{8}'' .. .. = {\cdot}25$	$2 \times {\cdot}25 + \frac{1}{4}\pi \times 2'' \times 2'' .. = 3{\cdot}64$	·01	·09
?	..	?	? .. .. = ?	? + ? .. .. = ?	?	?
?	..	..	$8'' \times 2'' + 2'' \times \frac{1}{8}'' .. = 17$	$2 \times 17 + 2 \times \frac{1}{4}\pi \times 2'' \times 2'' = 40{\cdot}3$	1	1
4 oz.	11 oz.	..	$\frac{1}{8} \times \frac{1}{4}\pi \times 6'' \times 1{\cdot}5'' .. = 3{\cdot}5$	$2 \times 3{\cdot}5 + \frac{1}{4}\pi \times 6'' \times 6'' .. = 35{\cdot}3$	·05	·21
?	..	8 oz.	$\cdot 036'' \times (22 \times 12)'' = 9{\cdot}5$	$2 \times 9{\cdot}5 .. .. .. = 19$	·13	·11
90 oz.	..	..	$8{\cdot}5'' \times 8{\cdot}5'' .. .. = 72{\cdot}25$	$2 \times 72{\cdot}25 + 2 \times \frac{1}{4}\pi \times (8{\cdot}5'' + 7{\cdot}5'') \times 1'' .. .. = 169{\cdot}6$	1	1
4·1 oz.	4·1 oz.	..	$6'' \times \frac{3}{8}'' .. .. = 4{\cdot}5$	$2 \times 4{\cdot}5 + \frac{1}{4}\pi \times 6'' \times 6'' .. = 37{\cdot}3$	·06	·19
?	..	8·2 oz.	$\frac{1}{10}'' \times (70 \times 12)'' .. = 52{\cdot}5$	$2 \times 52{\cdot}5 .. .. .. = 105$	·78	·52
204·5 oz.	..	..	$12'' \times 6'' .. .. = 72$	$2 \times 72 + 2 \times \frac{1}{4}\pi \times 6'' \times 6'' = 200{\cdot}5$	1	1
?	?	..	$1'' \times \frac{1}{8}'' .. .. = {\cdot}125$	$2 \times {\cdot}125 + \frac{1}{4}\pi \times 1'' \times 1'' = 1{\cdot}04$	·02	·07
?	..	?	$\frac{1}{10}'' \times (6 \times 12)'' .. = {\cdot}9$	$2 \times {\cdot}9 .. .. .. = 1{\cdot}8$	·18	·11
?	..	..	$\frac{1}{4}\pi \times 3'' \times 3'' .. = 7{\cdot}1$	$2 \times 7{\cdot}1 + 2 \times \frac{1}{4}\pi \times 1'' \times 1'' = 15{\cdot}8$	1	1
?	?	..	$3'' \times \frac{1}{4}'' .. .. = {\cdot}75$	$2 \times {\cdot}75 + \frac{1}{4}\pi \times 3'' \times 3'' .. = 8{\cdot}6$	·11	·30
24 gr.	..	?	$\cdot 012'' \times (10 \times 12)'' = 1{\cdot}44$	$2 \times 1{\cdot}44 .. .. .. = 2{\cdot}88$	·20	·10
?	..	..	$\frac{1}{4}\pi \times 3'' \times 3'' .. = 7{\cdot}1$	$4 \times 7{\cdot}1 .. .. .. = 28{\cdot}4$	1	1
?	6 gr. to 15 gr.	..	$1'' \times \frac{2}{10}'' .. .. = {\cdot}2$	$2 \times {\cdot}2 + \frac{1}{4}\pi \times 1'' \times 1'' .. = 1{\cdot}19$	·10	·14
?	?	30 gr.	$\frac{1}{1000}'' \times (10 \times 12)'' .. = 1{\cdot}0$	$2 \times 1{\cdot}0 .. .. .. = 2{\cdot}0$	·48	·24
?	?	30 gr.	$\frac{1}{100}'' \times (10 \times 12)'' .. = 1{\cdot}5$	$2 \times 1{\cdot}5 .. .. .. = 3{\cdot}0$	·72	·36
540 gr.	..	..	$\frac{1}{4}\pi \times 1\frac{1}{8}'' \times 1\frac{1}{8}'' .. = 2{\cdot}07$	$4 \times 2{\cdot}07 .. .. .. = 8{\cdot}3$	1	1

Digitized by Google

ABSTRACT TABLE 3.

VERTICAL VELOCITY-CURVES—ABSTRACT OF RESULTS.

This Table is an Abstract from the Detailed Tables VII—XV., with additional Results.

Two lines are devoted to each Series. The "Mean Results" are shown throughout: the "Ranges" are shown in second line of Sub Col. H, and of Cols. 3, 6, 8; and "Probable Errors" in second line of Col. 11.

SITES.	1		2			3		4		6		8				9				10					11			
	Position of Vertical.	Serial No.	Sub-Float. Number of Sets. Wood (W), Copper (C).	Sub-Float. Longest Connector.	Rod. Number of Sets. Wood (W), Tin (T). Length.	Average Depth in Float-Course.	Surface Fall. Upper Sub-Reach	Surface Fall. Lower Sub-Reach.	Average Wind. Direction.	Average Wind. Velocity.	Surface Velocity.	Bed Velocity.	Mean Velocity past the vertical. Approximations. Discharge Depth	Mid-depth Velocity.	By $\frac{1}{4}$ depth Velocity.	Rod-Velocity.	Differences.				Ratios.					Parabolic Elements.			
																	$(U - v_0)$.	$(v_{\frac{1}{4}H} - U)$.	$(v_m - U)$.	$(v - U)$.	$U \div v_0$.	$U \div v_{\frac{1}{4}H}$.	$U \div v_m$.	$U \div v$.	$v_H \div v_0$.	Depth of max. velocity.	$Z \div H$.	Max. velocity.	Parameter.
						H	F_1	F_2			v_0	v_H	U	$v_{\frac{1}{4}H}$	v_m	v										Z	ζ	V	p
SOLANI LEFT AQUEDUCT. CENTRAL		1	20 W	9	20 W 9	9·46	5·67	5·30	SW$\frac{1}{2}$W	2	4·25	3·51	3·99	4·04	3·98	3·77	−	+	−	−	·939	·988	1·002	1·058	·826	·36	·038	4·25	102·4
						·25	·15	·30			·28	·68	·16	·40	?	·55	·26	·05	·01	·22						·31		·01	8·2
		2	22 W	8	None	8·96	5·71	4·86	SE$\frac{1}{2}$E	1	4·34	3·57	4·11	4·21	4·13	?	−	+	+	?	·947	·976	·995	?	·823	1·30	·145	4·35	69·7
						·05	·05	·05			·58	·55	·21	·25	?		·23	·10	·02							·19		·01	3·6
		3	12 W	6	12 W 6	7·25	5·85	3·83	S	3	3·82	3·27	3·63	3·65	3·51	3·56	−	+	−	−	·950	·995	1·017	1·020	·856	1·04	·143	3·86	42·2
						·00	·00	·05			·34	·67	·21	·24	?	·39	·19	·02	·06	·07						·51		·03	7·6
		4	4 W	5	4 W 5	5·92	5·88	2·52	S	15	3·47	3·03	3·32	3·39	3·25	3·32	−	+	−	·00	·957	·979	1·022	1·000	·873	1·15	·194	3·53	27·7
						·05	·05	·05			·07	·35	·10	·20	?	·33	·15	·07	·07							·44		·04	4·9

Digitized by Google

SOLANI HIGHT AQUEDUCT.

Left Aqueduct open.

| | | |

ABSTRACT TABLE 4.

VERTICAL VELOCITY-CURVES—ABSTRACT OF RESULTS.

This Table is an Abstract from the Detailed Tables XVI—XXVIII., with additional Results.

Two lines are devoted to each Series. The "Mean Results" are shown throughout; the "Ranges" are shown in second line of Sub Col. H, and of Cols. 3, 6, 8; and "Probable Errors" in second line of Col. 11.

SITES.	1		2			3			4		6		8				9				10					11			
	Position of Vertical.	Serial No.	Sub-Float. Number of Sets. Wood (W), Copper (C). Longest Connector.	Rod. Number of Sets. Wood (W), Tin (T). Length.	Average Depth in Float-Course. H	Fall of Water-Surface. Upper Sub-Reach. F_1	Middle Sub-Reach. F_2	Lower Sub-Reach. F_3	Average Wind. Direction.	Velocity.	Surface Velocity. v_0	Bed Velocity. v_H	Mean Velocity past the vertical. Discharge / Depth. U	Approximations. Mid-depth Velocity. $v_{\frac{1}{2}H}$	By $\frac{3}{10}$-depth Velocity. v_m	Rod-Velocity. s	Differences. $(U - v_0)$.	$(v_{\frac{1}{2}H} - U)$.	$(v_m - U)$.	$(s - U)$.	Ratios. $U \div v_0$.	$U \div v_{\frac{1}{2}st.}$	$U \div v_m$.	$U \div s$.	$v_H \div v_0$.	Parabolic Elements. Depth of max. velocity. Z	$Z \div H$. ζ	Max. velocity. V	Parameter. p
SOLANI EMBANKMENT, MAIN SITE.	CENTRAL	21	16 C 10	14 T 9	10·89	4·77	1·19	5·39	E	4	4·39	4·08	4·27	4·26	4·24	3·97	–	–	–	–	·973	1·002	1·007	1·076	·929	·27	·025	4·44	206·5
				2 T 9½	·28	·04	·07	·22			·54	·73	·32	·48	?	·65	·12	·01	·03	·30						1·29		·02	61·8
		22	5 C 7	14 T 7	7·93	4·64	1·38	3·05	SSE	4	3·48	3·26	3·47	3·55	3·42	3·29	–	+	–	–	·997	·977	1·015	1·055	·937	2·28	·288	3·61	50·9
			11 C 8	2 T 7½	·25	·43	·22	·75			·31	·71	·20	·41	?	·22	·01	·08	·05	·18						·51		·04	6·8
		23	10 C 6	10 T 6	7·79	5·21	1·15	3·34	Calm		4·26	3·50	4·07	4·09	4·10	4·00	–	+	+	–	·955	·995	·993	1·018	·822	·49	·063	4·29	73·1
					·03	·03	·00	·03			·30	·79	·23	·33	?	·20	·19	·02	·03	·07						·98		·03	26·6
		24	6 C 7	4 T 6½	7·39	4·63	1·41	2·81	W	8	3·39	2·88	3·26	3·29	3·24	3·14	–	+	–	–	·962	·991	1·006	1·038	·850	1·06	·143	3·43	61·2
				2 T 7	·11	·09	·04	·22			·34	·32	·18	·16	?	·18	·13	·03	·02	·12						·48		·02	9·0
		25	12 C 6	12 T 6	7·26	5·22	1·23	3·02	NNE	4	3·88	3·34	3·74	3·81	3·74	3·53	–	+		–	·964	·982	1·000	1·059	·861	1·29	·178	3·92	54·6
					·11	·14	·01	·10			·44	·76	·31	·44	?	·43	·14	·07	·00	·21						·29		·02	5·4
		26	7 C 5	7 T 5	6·50	4·86	·91	1·38	S	7	2·91	2·50	2·85	2·88	2·81	2·82	–	+	–	–	·979	·990	1·014	1·011	·859	1·58	·243	3·02	30·5
					·06	·06	·00	·06			·17	·87	·12	·14	?	·12	·06	·03	·04	·03						·58		·06	6·5
		27	16 C 5	16 T 5	6·24	5·02	1·12	2·41	N	2	3·34	2·86	3·21	3·26	3·21	3·11	–	+		–	·961	·985	1·000	1·032	·856	1·09	·175	3·37	45·9
					·07	·07	·00	·07			·32	·87	·21	·39	..	·46	·13	·05	·00	·10						·19	–	·01	3·5
		28	16 C 5	16 T 5	6·16	4·70	·91	1·12	E	5	2·84	2·24	2·63	2·67	2·62	2·59	–	+	–	–	·926	·985	1·004	1·015	·789	–·13	·021	2·84	62·7
					·24	·09	·01	·08			·57	·55	·19	·32	..	·32	·21	·04	·01	·04						·00		·00	·0

Digitized by Google

SOLANI RIGHT AQUEDUCT.	41⅞L	29	16 c 8	16 T 8	8·39 ·22	5·80 ·18	No middle Sub-Reach.	4·95 ·25	SSW	2	2·34 ·54	2·44 ·59	2·63 ·33	2·70 ·38	2·57 ?	2·81 ·29	+ ·29	+ ·07	− ·06	+ ·18	1·124	·974	1·023	·936	1·043	4·65 1·17	·554	2·70 ·12	69·4 13·9
	41⅞L	30	5 c 7	5 T 7	6·96 ·20	5·86 ·07		3·94 ·15	N	1	2·42 ·26	2·54 ·58	2·73 ·12	2·81 ·16	2·70 ?	2·92 ·27	+ ·31	+ ·08	− ·03	+ ·19	1·128	·972	1·011	·935	1·050	3·47 ·93	·499	2·83 ·15	32·4 6·9
	41½L	31	16 c 8	16 T 8	8·45 ·23	5·79 ·10		4·59 ·30	S	7	2·72 ·44	2·61 ·76	2·91 ·20	3·00 ·27	2·92 ?	2·97 ·35	+ ·19	+ ·09	+ ·01	+ ·06	1·070	·970	·997	·980	·960	4·12 ·63	·488	3·01 ·06	63·5 7·4
	40L	32	2 w 14 c 8	16 w 8	8·64 ·15	5·81 ·10		4·73 ·05	S	7	3·07 ·54	2·99 ·39	3·28 ·23	3·37 ·24	3·27 ?	3·37 ·36	+ ·21	+ ·09	− ·01	+ ·09	1·068	·973	1·008	·973	·974	3·95 ·25	·457	3·40 ·03	47·7 2·3
	40L	33	16 c 8	5 w 8 11 T 8	8·62 ·20	5·86 ·10		4·64 ·28	SSW	3	3·14 ·70	3·29 1·15	3·40 ·42	3·44 ·37	3·36 ?	3·42 ·43	+ ·26	+ ·04	− ·04	+ ·02	1·083	·988	1·012	·994	1·048	4·38 ·67	·508	3·49 ·08	56·6 6·8
	37½L	34	16 w 9	16 w 9	9·42 ·20	5·80 ·10		5·24 ·15	S	4	3·52 ·49	3·21 ·53	3·68 ·14	3·83 ·35	3·64 ?	3·68 ·26	+ ·16	+ ·15	− ·04	·00	1·045	·961	1·011	1·001	·912	3·69 ·25	·392	3·87 ·04	42·3 2·0
	30L	35	4 w 9	4 w 9	9·55 ·23	5·79 ·10		5·37 ·18	WSW	7	4·16 ·26	3·60 ·53	4·10 ·25	4·15 ·21	4·09 ?	3·92 ·45	− ·06	+ ·05	− ·01	− ·18	·986	·988	1·002	1·046	·865	2·57 ·78	·269	4·28 ·06	67·1 11·1
	30L	36	15 w 9	15 w 9	9·33 ·18	5·81 ·10		5·20 ·10	SW ½ S	3	4·13 ·45	3·69 ·86	4·04 ·40	4·10 ·48	4·03 ?	3·95 ·45	− ·09	+ ·06	− ·01	− ·09	·978	·985	1·002	1·023	·893	2·23 ·49	·239	4·23 ·03	67·8 7·3
	30L	37	18 w 9	18 w 9	9·01 ·15	5·84 ·12		4·98 ·15	S ½ W	3	4·12 ·34	3·58 ·24	3·96 ·17	4·03 ·35	3·91 ?	3·75 ·29	− ·16	+ ·07	− ·05	− ·21	·961	·983	1·013	1·056	·869	1·28 ·31	·142	4·14 ·01	87·0 7·3
	30R	38	12 w 9	12 w 9	9·17 ·18	5·84 ·30		5·12 ·13	S	4	3·63 ·55	3·33 ·39	3·73 ·22	3·87 ·23	3·71 ?	3·63 ·22	+ ·10	+ ·14	− ·02	− ·10	1·028	·964	1·005	1·028	·917	3·61 ·23	·394	3·87 ·03	53·1 2·3
	30R	39	4 w 9	4 w 9	8·85 ·00	5·85 ·00		4·95 ·00	SW ½ S	7	3·93 34	3·45 ·16	3·85 ·06	3·96 ·11	3·87 ?	3·66 ·04	− ·08	+ ·11	+ ·02	− ·19	·980	·972	·995	1·052	·878	2·55 ·48	·288	4·00 ·03	68·8 7·6
	37½R	40	16 w 8	16 w 8	8·68 ·20	5·80 ·20		4·74 ·25	S	3	3·13 ·34	2·92 ·60	3·27 ·13	3·39 ·31	3·25 ?	3·36 ·29	+ ·14	+ ·12	− ·02	+ ·09	1·044	·965	1·006	·973	·933	3·41 ·36	·393	3·42 ·05	43·8 3·2
SOLANI EMBANKMENT, MAIN SITE	79½L	41	16 c 2	16 T 2½	2·58 ·11	4·58 ·02	1·20 ·04	4·84 ·09	W ½ S	5	2·54 ·39	2·17 ·65	2·40 ·31	2·42 ·42	2·39 ?	2·32 ·38	− ·14	+ ·02	− ·01	− 08	·945	·992	1·004	1·034	·854	−·14 ·00	·054	2·54 ·00	18·2 ·0
	75½L	42	16 c 5	3 T 5 13 T 5½	5·60 ·26	4·86 ·48	1·17 ·20	5·22 ·22	SE ½ E	3	3·40 ·51	3·03 1·16	3·29 ·43	3·32 ·63	3·28 ?	3·01 ·48	− ·11	+ ·03	− ·01	− 28	·968	·991	1·008	1·093	·891	·61 ·63	·109	3·42 ·02	56·8 15·6
	75½L	43	16 c 3	6 T 3 10 T 3½	3·61 ·31	4·61 ·11	1·87 ·03	3·87 ·20	S ½ E	3	2·66 ·43	2·23 ·73	2·51 ·29	2·55 ·26	2·51 ?	2·38 ·31	− ·15	+ ·04	·00	− ·13	·944	·984	1·000	1·055	·838	−·17 ·26	·047	2·66 ·01	33·3 6·3
	74½L	44	5 c 8	5 T 8	8·78 ·28	4·61 ·14	1·22 ·09	4·41 1·13	NE ½ N	3	2·83 ·40	2·26 ·27	2·53 ·05	2·42 ·11	2·50 ?	2·36 ·12	− ·30	− ·11	− ·03	− ·17	·894	1·045	1·012	1·072	·799	·54 ·38	?	2·83 ·02	28·9 5·8
	74½L	45	6 c 8	6 T 8	8·49 ·19	4·59 ·09	1·22 ·06	4·36 ·13	WNW	4	2·70 ·17	2·27 ·53	2·49 ·14	2·43 ·08	2·44 ?	2·39 ·09	− ·21	− ·06	− ·05	− ·10	·922	1·025	1·020	1·042	·841	·61 ·38	?	2·71 ·01	50·0 10·1
	74½L	46	8 c 8	8 T 8	8·19 ·18	4·61 ·08	1·27 ·11	4·12 ·15	NNW	1	2·63 ·23	2·18 ·43	2·40 ·15	2·40 ·40	2·35 ?	2·31 ·18	− ·23	·00	− ·05	− ·09	·913	1·000	1·021	1·039	·829	−·76 ·47	?	2·64 ·01	73·7 21·9

Digitized by Google

MOST PROBABLE PARABOLA.

Co-efficients of A, B, C; of v_z in values of L, M, N; of L, M, N; Weights of A, B, C, &c.

Co-efficient Symbol.	Value of Co-efficients of A, B, C.								Equation of Parabola.
	$n=3$	$n=4$	$n=5$	$n=6$	$n=7$	$n=8$	$n=9$	$n=10$	
$\Sigma_o^n(n+1-z)$,	10	15	21	28	36	45	55	66	$v = A + Bz + Cz^2$.
$\Sigma_o^n((n+1-z).z)$,	10	20	35	56	84	120	165	220	
$\Sigma_o^n((n+1-z).z^2)$,	20	50	105	196	336	540	825	1,210	
$\Sigma_o^n((n+1-z).z^3)$,	46	146	371	812	1,596	2,892	4,917	7,942	
$\Sigma_o^n((n+1-z).z^4)$,	116	470	1,449	3,724	8,400	17,172	32,505	57,838	

Co-efficients of v_z in values of L, M, N.

Argument, (z).	$n=3$			$n=4$			$n=5$			$n=6$			$n=7$			$n=8$			$n=9$			$n=10$		
	L	M	N	L	M	N	L	M	N	L	M	N	L	M	N	L	M	N	L	M	N	L	M	N
	$(n+1-z)$.	$(n+1-z).z$.	$(n+1-z).z^2$.	$(n+1-z)$.	$(n+1-z).z$.	$(n+1-z).z^2$.	$(n+1-z)$.	$(n+1-z).z$.	$(n+1-z).z^2$.	$(n+1-z)$.	$(n+1-z).z$.	$(n+1-z).z^2$.	$(n+1-z)$.	$(n+1-z).z$.	$(n+1-z).z^2$.	$(n+1-z)$.	$(n+1-z).z$.	$(n+1-z).z^2$.	$(n+1-z)$.	$(n+1-z).z$.	$(n+1-z).z^2$.	$(n+1-z)$.	$(n+1-z).z$.	$(n+1-z).z^2$.
0	4	..	..	5	..	..	6	..	..	7	..	..	8	..	..	9	..	..	10	..	..	11	..	..
1	3	3	3	4	4	4	5	5	5	6	6	6	7	7	7	8	8	8	9	9	9	10	10	10
2	2	4	8	3	6	12	4	8	16	5	10	20	6	12	24	7	14	28	8	16	32	9	18	36
3	1	3	9	2	6	18	3	9	27	4	12	36	5	15	45	6	18	54	7	21	63	8	24	72
4	..	..	..	1	4	16	2	8	32	3	12	48	4	16	64	5	20	80	6	24	96	7	28	112
5	..	..	..	..	..	..	1	5	25	2	10	50	3	15	75	4	20	100	5	25	125	6	30	150
6	..	..	..	..	..	..	..	..	..	1	6	36	2	12	72	3	18	108	4	24	144	5	30	180
7	..	..	..	..	..	..	..	..	..	..	..	..	1	7	49	2	14	98	3	21	147	4	28	196
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	8	64	2	16	128	3	24	192
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	9	81	2	18	162
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	10	100

Argument, (n).	Coefficients of L, M, N in values of A, B, C.												Weights of A, B, C.			Square Roots of Weights of A, B, C.		
	A				B				C									
	a	λ_1	μ_1	ν_1	β	λ_2	μ_2	ν_2	γ	λ_3	μ_3	ν_3	G_a	G_b	G_c	$\sqrt{G_a}$	$\sqrt{G_b}$	$\sqrt{G_c}$
3	70	17	−20	5	42	−12	38	−13	42	3	−13	5	4·12	1·11	8·4	2·03	1·05	2·90
4	140	26	−25	5	168	−30	65	−17	168	6	−17	5	5·38	2·58	33·6	2·32	1·61	5·80
5	252	37	−30	5	168	−20	33	−7	504	10	−21	5	6·82	5·09	100·8	2·61	2·26	10·04
6	84	10	−7	1	252	−21	28	−5	252	3	−5	1	8·40	9·00	252·0	2·90	3·00	15·9
7	132	13	−8	1	2,772	−168	188	−29	2,772	21	−29	5	10·15	14·74	554·0	3·19	3·84	23·6
8	990	82	−45	5	1,848	−84	81	−11	5,544	28	−33	5	12·07	22·81	1,109	3·48	4·78	33·3
9	1,430	101	−50	5	10,296	−360	305	−37	10,296	36	−37	5	14·16	33·76	2,059	3·76	5·81	45·4
10	2,002	122	−55	5	18,018	−495	374	−41	18,018	45	−41	5	16·41	48·18	3,604	4·05	6·94	60·0

Digitized by Google

DEPRESSION OF MAXIMUM VELOCITY LINE.

Central Vertical.

The Series are arranged by order of increasing relative depth of max. velocity line at each Site; (Argument, $\zeta = z \div H$).

Solani Sites.	Serial No.	Number of Sets.	Data. Depth.	Surface-Fall. Sub-Reaches. Upper.	Middle.	Lower.	Mean Velocity.	Average Wind. Direction.	Velocity.	Depth of maximum velocity. Actual.	Probable Error.	Relative.
			H	F_1	F_2	F_3	U			z	$\pm R_z$	ζ
Left Aqueduct.	1	20	9·46	5·67	No Middle Sub-Reach.	5·30	3·99	SW ŏ W	2	·36	·31	·038
	3	12	7·25	5·85		3·83	3·63	S	3	1·04	·51	·143
	2	22	8·96	5·71		4·86	4·11	SE ŏ E	1	1·30	·19	·145
	4	4	5·92	5·88		2·52	3·32	S	15	1·15	·44	·194
Right Aqueduct. [L. Aq. closed]	19	8	4·21	6·39	No Middle Sub-Reach.	1·21	5·85	SW	2	− 6·17	·00	−1·47
	20	10	3·99	6·61		·99	5·47	SW	3	·37	·15	·093
	18	4	4·66	6·40		1·66	6·40	NW ŏ W	6	1·23	·51	·264
Right Aqueduct. [Left Aqueduct open].	12	20	7·59	5·81		4·09	3·65	S ŏ E	2	1·48	·26	·195
	8	16	8·42	5·82		4·62	3·95	NE ŏ N	2	1·78	·49	·211
	16	16	6·01	6·37		2·81	3·89	S	4	1·33	·35	·221
	17	3	5·55	6·35		3·05	3·66	S	6	1·38	·55	·249
	15	9	6·22	6·15		2·62	4·02	N	3	1·60	·38	·257
	11	15	7·75	5·86		4·23	3·99	W	2	2·04	·43	·263
	13	4	7·15	6·06		3·85	3·99	Calm.		1·89	·37	·264
	7	18	8·85	5·80		4·86	4·00	S ŏ W	5	2·34	1·43	·264
	9	14	8·32	5·98		4·53	4·32	S ŏ W	2	2·22	·77	·267
	5	16	9·94	5·98		5·45	4·61	NE ŏ E	2	3·23	·75	·325
	6	16	9·41	5·84		5·23	4·27	NE ŏ E	4	3·08	·70	·327
	14	16	6·77	5·96		3·19	3·91	S ŏ W	3	2·27	·62	·335
Embankment, Main Site.	28	16	6·16	4·70	·91	1·12	2·63	E	5	− ·13	·00	−·021
	21	16	10·89	4·77	1·19	5·39	4·27	E	4	·27	1·29	·025
	23	10	7·79	5·21	1·15	3·34	4·07	Calm.		·49	·98	·063
	24	6	7·39	4·63	1·41	2·81	3·26	W	8	1·06	·48	·143
	27	16	6·24	5·02	1·12	2·41	3·21	N	2	1·09	·19	·175
	25	12	7·26	5·22	1·23	3·02	3·74	NNE	4	1·29	·29	·178
	26	7	6·50	4·86	·91	1·38	2,85	S	7	1·58	·58	·243
	22	16	7·93	4·64	1·38	3·05	3·47	SSE	4	2·28	·51	·288

Digitized by Google

PARAMETER-VARIATION.

Central Vertical Velocity-Parabolæ.

The Series are arranged by order of decreasing parameter at each site ; (Argument, p).

Serial No.	Number of Sets.	Parameter. Magnitude.	Parameter. Probable Error.	Data. Depth.	Data. Depth of Max. Vely.	Data. Mean Vely.	Data. Surface-Fall Upper Sub-Reach	Data.	Trial Quantities for tracing parameter variation.								
		p	$\pm R_p$	H	Z	U	F_1	$(\sigma_{1R}-U)$.	$H^2 \div 12\,(\sigma_{1R}-U)$.	$H^2 \div U$.	$H^2 \div \sqrt{U}$.	$H^2 \div \sqrt{\beta U}$.	$(H-Z)$.	$(H-Z)^2$.	$(H-Z)^2 \div \sqrt{U}$.	$(H-Z)^2 \div U$.	$(H-Z)^2 \div \sqrt{HF}$
Solání Left Aqueduct.																	
1	20	102·4	8·2	9·46	·36	3·99	5·67	+·05	149	22·4	44·8	62·7	9·10	82·8	41·4	20·75	11·31
2	22	69·7	3·6	8·96	1·30	4·11	5·71	+·10	67	19·5	39·6	54·6	7·66	58·7	28·9	14·28	8·21
3	12	42·2	7·6	7·25	1·04	3·63	5·85	+·02	219	14·5	27·5	36·3	6·21	38·6	20·2	10·62	5·92
4	4	27·7	4·9	5·92	1·15	3·32	5·88	+·07	42	10·6	19·3	24·5	4·77	22·8	12·5	6·85	3·86
Solání Right Aqueduct. [Left Aqueduct closed].																	
19	8	155·5	·0	4·21	−6·17	5·85	6·39	·00	∞	3·0	7·3	8·7	10·38	107·7	44·5	18·42	20·77
18	4	30·1	7·1	4·66	1·23	6·40	6·40	+·03	60	3·4	8·6	10·4	3·43	11·8	4·7	1·83	2·15
20	10	18·7	2·0	3·99	·37	5·47	6·61	+·03	44	2·9	6·8	8·0	3·62	13·1	5·6	2·39	2·54
Solání Right Aqueduct.																	
6	16	89·5	12·6	9·41	3·08	4·27	5·84	+·05	148	20·7	42·8	59·9	6·33	40·1	19·4	9·38	5·40
5	16	89·3	13·2	9·94	3·23	4·61	5·98	+·01	823	21·4	46·0	65·3	6·71	45·0	20·9	9·77	5·83
8	16	79·5	9·9	8·42	1·78	3·95	5·82	+·07	84	18·0	35·6	48·4	6·64	44·1	22·2	11·14	6·29
7	18	79·2	47·8	8·85	2·34	4·00	5·80	+·07	93	19·6	39·2	54·1	6·51	42·4	21·2	10·60	5·91
9	14	75·0	13·9	8·32	2·22	4·32	5·98	−·07	?	16·0	33·3	45·3	6·10	37·2	17·9	8·61	5·27
11	15	62·0	7·2	7·75	2·04	3·99	5·86	+·07	72	15·0	30·0	40·2	5·71	32·6	16·3	8·17	4·83
13	4	49·1	5·0	7·15	1·89	3·99	6·06	+·07	61	12·8	25·6	33·8	5·26	27·8	13·8	6·93	4·20
12	20	48·0	3·6	7·59	1·48	3·65	5·81	+·06	80	15·8	30·2	40·2	6·11	37·3	19·5	10·25	5·62
15	9	42·2	5·2	6·22	1·60	4·03	6·15	+·07	46	9·6	19·2	24·6	4·62	21·3	10·6	5·30	3·44
14	16	36·4	6·4	6·77	2·27	3·91	5·96	+·04	96	11·7	23·1	30·3	4·50	20·3	10·2	5·18	3·18
16	16	33·7	4·6	6·01	1·33	3·89	6·37	+·03	100	9·3	18·3	23·4	4·68	21·9	11·1	5·63	3·53
17	3	27·4	5·7	5·55	1·38	3·66	6·35	+·10	26	8·4	16·1	20·1	4·17	17·4	9·1	4·75	2·92
Solání Embankment, Main Site.																	
21	16	206·5	61·8	10·89	·27	4·27	4·77	−·01	?	27·7	57·3	83·1	10·62	112·8	54·5	26·40	15·60
23	10	73·1	26·6	7·79	·49	4·07	5·21	+·02	253	14·9	30·0	40·5	7·30	53·3	26·4	13·09	8·37
28	16	62·7	·0	6·16	−·13	2·63	4·70	+·04	79	14·4	23·4	30·0	6·29	39·6	24·4	15·04	7·35
24	6	61·2	9·0	7·39	1·06	3·26	4·63	+·03	152	16·7	30·2	40·2	6·33	40·1	22·1	12·29	6·85
25	12	54·6	5·4	7·26	1·29	3·74	5·22	+·07	63	14·1	27·3	36·0	5·97	35·6	18·5	9·53	5·79
22	16	50·9	6·8	7·93	2·28	3·47	4·64	+·08	66	18·1	33·8	45·6	5·65	31·9	17·2	9·20	5·26
27	16	45·9	3·5	6·24	1·09	3·21	5·22	+·05	65	12·1	21·7	27·8	5·15	26·5	14·8	8·26	4·74
26	7	30·5	6·5	6·50	1·58	2·85	4·86	+·03	117	14·8	25·0	32·3	4·92	24·2	14·3	8·49	4·31

Digitized by Google

MEAN VELOCITY PAST CENTRAL VERTICAL, VARIATION.

The Series are arranged by order of decreasing Mean Velocity past the vertical, (Argument, U).

Serial No.	Number of Sets.	Mean Velocity.	Surface Velocity.	Depth.	Surface-Fall.				Trial Quantities for approximation to the Mean Velocity.								Ratio $U \div s_0$.
					Upper Sub-Reach.	Middle Sub-Reach.	Lower Sub-Reach.	Whole Reach.	Type HF.			Type $\sqrt{HF}$		Other Types.			
		U	s_0	H	F_1	F_2	F_3	F	HF_1.	HF_3.	HF.	$\sqrt{HF_1}$.	$\sqrt{HF}$.	$F_1\sqrt{H}$.	$F_1^2.\sqrt{H}$.	$F_1.\sqrt[3]{H}$.	$\sqrt{F_1\sqrt{H}}$.	c
Solání Left Aqueduct.																	
2	22	4·11	4·34	8·96	5·71	No Middle Sub-Reach.	4·86	10·57	51·2	No Middle Sub-Reach.	94·7	7·15	9·73	17·1	97·6	9·88	4·13	·947
1	20	3·99	4·25	9·46	5·67		5·30	10·97	53·6		103·8	7·32	10·19	17·5	98·4	9·92	4·18	·939
3	12	3·63	3·82	7·25	5·85		3·83	9·68	42·4		70·2	6·51	8·38	15·7	92·0	9·59	3·97	·950
4	4	3·32	3·47	5·92	5·88		2·52	8·40	34·8		49·7	5·90	7·05	14·3	84·1	9·17	3·78	·957
Solání Right Aqueduct. [Left Aqueduct closed].																		
18	4	6·40	6·43	4·66	6·40	No Middle Sub-Reach.	1·66	8·06	29·8	No Middle Sub-Reach.	37·6	5·46	6·13	13·8	88·5	9·41	3·72	·995
19	8	5·85	6·05	4·21	6·39		1·21	7·60	26·9		32·0	5·19	5·66	13·1	83·5	9·14	3·62	·967
20	10	5·47	5·65	3·99	6·61		·99	7·60	26·4		30·3	5·14	5·51	13·2	86·9	9·32	3·64	·968
Solání Right Aqueduct.																		
5	16	4·61	4·58	9·94	5·98	No Middle Sub-Reach.	5·45	11·43	59·4	No Middle Sub-Reach.	113·6	7·71	10·66	18·8	111·9	10·58	4·34	1·007
10	2	4·41	4·47	8·13	6·02		4·43	10·45	48·9		85·0	7·00	9·22	17·2	103·4	10·17	4·14	·987
9	14	4·32	4·28	8·32	5·98		4·53	10·51	49·8		87·4	7·05	9·35	17·2	103·4	10·17	4·15	1·009
6	16	4·27	4·23	9·41	5·84		5·23	11·07	55·0		104·2	7·41	10·21	17·9	104·4	10·22	4·23	1·009
15	9	4·03	4·09	6·22	6·15		2·62	8·77	38·3		54·5	6·18	7·39	15·3	94·5	9·72	3·91	·985
7	18	4·00	4·07	8·85	5·80		4·86	10·66	51·3		94·3	7·16	9·71	17·2	99·6	9·98	4·15	·983
13	4	3·99	4·05	7·15	6·06		3·85	9·91	43·3		70·9	6·58	8·42	16·2	97·6	9·88	4·02	·985
11	15	3·99	4·05	7·75	5·86		4·23	10·09	45·4		78·2	6·74	8·84	16·3	95·8	9·79	4·04	·985
8	16	3·95	4·03	8·42	5·82		4·62	10·44	49·0		87·9	7·00	9·38	16·9	97·8	9·89	4·11	·980
14	16	3·91	3·86	6·77	5·96		3·19	9·15	40·3		61·9	6·35	7·87	15·5	92·2	9·60	3·94	1·013
16	16	3·89	3·98	6·01	6·37		2·81	9·18	38·3		55·2	6·19	7·43	15·6	100·0	10·00	3·95	·977
17	3	3·66	3·74	5·55	6·35		3·05	9·40	35·2		52·2	5·94	7·22	15·0	95·6	9·78	3·87	·979
12	20	3·65	3·80	7·59	5·81		4·09	9·90	44·1		75·1	6·64	8·67	16·0	92·9	9·64	4·00	·961
Solání Embankment, Main Site.																		
21	16	4·27	4·39	10·89	4·77	1·19	5·39	11·35	51·9	13·0	123·6	7·21	11·12	15·7	75·3	8·68	3·97	·973
23	10	4·07	4·26	7·79	5·21	1·15	3·34	9·70	40·6	8·96	75·6	6·37	8·69	14·5	75·7	8·70	3·81	·955
25	12	3·74	3·88	7·26	5·22	1·23	3·02	9·47	37·9	8·93	68·8	6·16	8·29	14·0	73·3	8·56	3·75	·964
22	16	3·47	3·48	7·93	4·64	1·38	3·05	9·07	36·8	10·94	71·9	6·07	8·48	13·1	60·8	7·80	3·62	·997
24	6	3·26	3·39	7·39	4·63	1·41	2·81	8·85	34·2	10·42	65·4	5·85	8·09	12·6	58·4	7·64	3·55	·962
27	16	3·21	3·34	6·24	5·02	1·12	2·41	8·55	31·3	6·99	53·4	5·60	7·30	12·6	62·9	7·93	3·54	·961
26	7	2·85	2·91	6·50	4·86	·91	1·38	7·15	31·6	5·92	46·5	5·62	6·82	12·4	60·5	7·78	3·52	·979
28	16	2·63	2·84	6·16	4·70	·91	1·12	6·73	29·0	5·61	41·5	5·38	6·44	11·7	54·5	7·38	3·41	·926

Digitized by Google

ROD-MOTION, COMPARISON i.

Solání Twin Aqueducts—Central Vertical.

Rod-Velocity of Rods of 1′, 2′, 3′, &c., *n* feet immersion compared with Mean Velocity-Measurement through 1′, 2′, 3′, &c. ..... *n* feet depth deduced from Double-Floats.

Site.	1 Serial No. Present.	1 Serial No. 1874-5 Report.	1 Instrument.	1 Description of each line.	1 Number of Sets.	2 Depth on vertical. H	3 Surface-Fall. Upper 5 miles. F_1	3 Surface-Fall. Lower 4½ miles. F_3	4 Average Wind. Direction.	4 Average Wind. Velocity.	6 Rod-Velocities (u_z) and Double-Float Mean Velocities (U_z') past the central vertical through depths named below. Nominal Depths (z). z	0	1	2	3	4	5	6	7	H
Solani Left Aqueduct.	..	11R	Rods.	Means,	12	7·25	5·85	3·83	S	3	u_z=	3·82	3·88	3·86	3·80	3·78	3·66	3·55	?	3·55
				Range,	..	·00	·00	·00	..	..	..	·34	·54	·25	·24	·34	·31	·39	..	·39
	3	11B	Double-Floats.	Means,	12	7·25	5·85	3·83	S	3	U_z'=	3·82	3·85	3·87	3·86	3·81	3·76	3·70	?	3·63
				Range,	..	·00	·00	·00	..	..	..	·34	..	..	..	..	..	..	..	·21
			Differences ($u_z - U_z'$),						..	..	..	·00	+ ·03	− ·01	− ·06	− ·03	− ·10	− ·15	..	− ·08
	..	10R	Rods.	Means,	4	5·92	5·88	2·52	S	15	u_z=	3·47	3·58	3·43	3·42	3·34	3·31	..	..	3·31
				Range,	..	·05	·05	·05	..	..	..	·07	·04	·13	·16	·14	·33	..	..	·33
	4	10B	Double-Floats.	Means,	4	5·92	5·88	2·52	S	15	U_z'=	3·47	3·51	3·53	3·51	3·45	3·39	..	..	3·32
				Range,	..	·05	·05	·05	..	..	..	..	..	..	..	..	..	..	..	·10
			Differences ($u_z - U_z'$),						..	..	..	·00	+ ·07	− ·10	− ·09	− ·11	− ·08	..	..	− ·01
Solani Right Aqueduct.	..	12R	Rods.	Means,	20	7·59	5·81	4·09	S *b* E	2	u_z=	3·80	3·83	3·84	3·85	3·79	3·74	3·64	3·57	3·57
				Range,	..	·10	·10	·10	..	..	..	·44	·35	·45	·30	·43	·41	·47	·57	·57
	12	12B	Double-Floats.	Means,	20	7·59	5·81	4·09	S *b* E	2	U_z'=	3·80	3·83	3·85	3·84	3·82	3·78	3·75	3·68	3·65
				Range,	..	·10	·10	·10	..	..	..	·30	..	..	..	..	..	..	..	·22
			Differences ($u_z - U_z'$),						..	..	..	·00	·00	− ·01	+ ·01	− ·03	− ·04	− ·11	− ·11	− ·08

Digitized by Google

ABSTRACT TABLE 10.

EFFECT OF DEPTH ON VELOCITY.

Solání Embankment, Main Site—Abstract of Mean Velocities over Top Immersed Step of either Bank.

[The number of Sets of velocity-measurements over the top immersed step is not always the same on both banks: the velocity-measurements on one bank having been occasionally omitted where the depth of water on the step was trifling].

Series.	Range of water-level.	Left Bank.					Right Bank.				
		Number of Sets.	Step No.	Depth on Step.	Mean Velocities. From — To.	Mean Velocities. Remarks.	Number of Sets.	Step No.	Depth on Step.	Mean Velocities. From — To.	Mean Velocities. Remarks.
151	·16	1	4	·09	·46	.. ..	5	4	·28—·12	1·38— ·90	Irregular decrease.
		4	5	·75—·68	1·84—1·67	Irregular					
152	·26	1	4	·08	·58	.. ..	15	4	·27—·06	1·36— ·64	Fairly regular decrease.
		16	5	·78—·57	2·06—1·52	Irregular decrease	2	5	·76	1·68—1·65	
153	·28	6	5	·51—·23	1·64— ·85	Steady decrease	6	5	·70—·42	2·06—1·47	Nearly steady decrease.
154	·18	5	6	·72—·54	1·67—1·34	Nearly steady decrease ..	3	5	·18—·07	2·05— ·81	Irregular decrease.
							2	6	·73—·72	1·90—1·88	
155	·29	6	6	·85—·06	1·44— ·47	Nearly steady decrease ..	6	6	·53—·24	2·08— ·96	Nearly steady decrease.
156	·06	4	7	·76—·70	1·55—1·45	Irregular	4	6	·18—·12	·97— ·71	Steady decrease.
157	·19	7	7	·53—·34	1·42— ·96	Irregular decrease	7	7	·69—·50	1·74—1·20	Irregular decrease.
158	·10	1	7	·14	·86	.. ..	2	7	·40—·30	1·36—1·19	Steady decrease.
159	·22	9	8	·71—·49	1·59—1·19	Irregular	3	7	·13—·05	1·62— ·52	Steady decrease.
							3	8	·76—·63	1·66—1·35	Steady decrease.
160	·27	1	8	·23	·68	.. ..	6	8	·37—·10	1·48— ·60	Nearly steady decrease.
		2	9	·77—·73	1·32—1·21	Increase					
161	·15	11	9	·65—·50	1·21— ·82	Irregular decrease	11	9	·78—·63	1·51—1·27	Irregular decrease.
162	·26	3	9	·32—·17	1·29— ·60	Irregular	5	9	·45—·19	1·19— ·79	Nearly steady decrease.
163	·15	2	10	·19—·15	·73— ·63	Decrease	6	10	·31—·16	·85— ·76	Irregular decrease.
164	·00	1	11	·51	·60	.. ..	1	11	·65	1·49	
165	·15	6	11	·28—·13	1·01— ·75	Nearly steady decrease ..	6	11	·42—·27	·98— ·83	Irregular decrease.
166	·27	3	12	·53—·26	1·14— ·85	Irregular decrease	3	12	·68—·41	1·03— ·90	Steady decrease.

Digitized by Google

ABSTRACT TABLE 11.

TRANSVERSE VELOCITY CURVES.

Area and Discharge-Formulæ and Float-Course Spacings.

e, Edge; t, top (immersed) step; q, quadrisection (of Side Space); m, middle (of Side Space). No velocity-measurements at points marked with * or †, viz. e*, q†, 75*, 84*, 42½*, 71¼†, 40½†.
Velocities at the edge (viz. at e*, 75*, 84*, 42½*) assumed zero in computing Discharge. Velocities interpolated (not measured) at q†, 71¼†, 40½†.

Site.	Number of Sets of velocity work	Number of Observed Ordinates.	Area and Discharge Formulæ, and Float-Course Spacings.	Breadth. Bed.	Surface. From	Surface. To
15th Mile Site. Old Site, ..	13	19	+ *Cubic* + ... *Simson's* ... + ... *Weddle's* ... ... + ... *Simson's* ... + *Cubic* + e* 84 82½ 80 75 70 65 60 40 20 0 20 40 60 65 70 75 80 82½ 84 e*	?160′	175′	171′
15th Mile Site. New Site, ..	4	19	+ *Simson's* modified. + ... *Simson's* ... + ... *Weddle's* ... ... + ... *Simson's* ... + *Simson's* modified. + e* q m q† 80 75 70 65 60 40 20 0 20 40 60 65 70 75 80 q† m q e*	160′	186′	184′
Solani Embankment, Main Site. Low Water, .. (below steps).	54	15	+ *Simson's* modified. + ... *Simson's* ... + ... *Weddle's* ... ... + ... *Simson's* ... + *Simson's* modified. + 75* 73¾ 72½ 71¼† 70 65 60 40 20 0 20 40 60 65 70 71¼† 72½ 73¾ 75*	150′	150′	150′
Solani Embankment, Main Site. High Water,.. (above lowest step).	99	16 to 21	+ *Special* + ... *Cubic* ... + ... *Weddle's* ... ... + ... *Cubic* ... + *Special* + t q m 75½ ; 74½ 70 65 60 40 20 0 20 40 60 65 70 74½ ; 75½ m q t	150′	171′	151′
Minor Sites, ..	10	17	+ *Simson's* + ... *Simson's* ... + ... *Weddle's* ... ... + ... *Simson's* ... + *Simson's* + 84* 82 80 75 70 65 60 40 20 0 20 40 60 65 70 75 80 82 84*	150′	169′	168′

Digitized by Google

| | | |

MEAN VELOCITY CURVES AT SAME WATER-LEVEL. ABSTRACT TABLE 12.

PROPORTIONALITY OF CORRESPONDING VELOCITY-ORDINATES.

SOLANI SITES.	Serial No.	No. of Sets.	Gauge. h or H.	Hyd. Mean Depth. R	ROD-VELOCITIES past each vertical. * The "Reduced Velocities" are the Rod-velocities of the upper Series reduced in the ratio of the Mean Velocities of the two Series compared.	Left of Centre.									Centre.	Right of Centre.								MEAN VELOCITY.	Ratio of
					Distances.	42½	41¼	40	37½	35	32½	30	20	10		10	20	30	32½	35	37½	39½	42½	V	V,V
RIGHT AQUEDUCT. [L. Aq. closed]. [L. Aq. open].	124	1	3·49	3·26	Rod-velocy.	?	2·20	2·32	2·44	2·61	2·53	2·46	2·47	2·53	2·60	2·65	2·52	2·44	2·21	2·25	2·17	2·03	?	2·43	3·42
					Reduced do.	?	·64	·68	·71	·76	·74	·72	·72	·74	·76	·78	·74	·71	·65	·66	·63	·59	?	·71	
	123	1	3·65	3·40	Rod-velocy.	?	·61	·62	·70	·65	·69	·68	·67	·73	·72	·78	·78	·76	·75	·72	·73	·63	?	·71	
					Difference	..	+·03	+·06	+·01	+·11	+·05	+·04	+·05	+·01	+·04	·00	−·04	−·05	−·10	−·06	−·10	−·04	..	·00	
	134	1	3·58	3·33	Rod-velocy.	?	2·08	2·27	2·27	2·70	2·83	2·93	3·19	3·49	3·70	3·59	3·51	3·51	3·39	3·11	2·79	2·78	?	3·22	4·67
					Reduced do.	?	·45	·49	·49	·58	·61	·63	·68	·75	·79	·77	·75	·75	·73	·67	·60	·60	?	·69	
	133	1	3·60	3·35	Rod-velocy.	?	·61	·65	·71	·65	·63	·65	·65	·64	·71	·79	·77	·73	·77	·74	·73	·65	?	·69	
					Difference	..	−·16	−·16	−·22	−·07	−·02	−·02	+·03	+·11	+·08	−·02	−·02	+·02	−·04	−·07	−·13	−·05	..	·00	

EMBANKMENT, MAIN SITE.						75	73¾	72½	70	65	60	40	20	0	20	40	60	65	70	72½	73¾	75		
	170	2	3·64	4·73	Rod-velocity ..	?	·99	1·13	1·19	1·28	1·28	1·74	1·68	1·43	1·46	1·64	1·52	1·24	1·08	1·00	·93	?	1·50	1·74
					Reduced do. ..	?	·57	·65	·68	·74	·74	1·00	·97	·82	·84	·94	·87	·71	·62	·57	·53	?	·86	
	171	3	3·62	4·72	Rod-velocity ..	?	·56	·60	·64	·74	·71	1·00	·97	·84	·89	·93	·83	·68	·63	·59	·52	?	·86	
					Difference ..	..	+·01	+·05	+·04	·00	+·03	·00	·00	−·02	−·05	+·01	+·04	+·03	−·01	−·02	+·01	..	·00	
	170	2	3·64	4·73	Rod-velocity ..	?	·99	1·13	1·19	1·28	1·28	1·74	1·68	1·43	1·46	1·64	1·52	1·24	1·08	1·00	·93	?	1·52	2·27
					Reduced do. ..	?	·44	·50	·52	·56	·56	·77	·74	·63	·64	·72	·67	·55	·48	·44	·41	?	·66	
	172	2	3·58	4·68	Rod-velocity ..	?	·39	·45	·50	·52	·52	·79	·71	·67	·69	·75	·63	·48	·43	·40	·38	?	·66	
					Difference ..	..	+·05	+·05	+·02	+·04	+·04	−·02	+·03	−·04	−·05	−·03	+·04	−·07	+·05	+·04	+·03	..	·00	
	177	4	2·42	3·64	Rod-velocity ..	?	·90	1·07	1·21	1·26	1·30	1·77	1·62	1·40	1·45	1·67	1·48	1·19	1·06	·97	·89	?	1·50	1·85
					Reduced do. ..	?	·49	·58	·65	·68	·70	·96	·88	·76	·78	·90	·80	·64	·57	·52	·48	?	·81	
	178	2	2·43	3·64	Rod-velocity ..	?	·55	·58	·65	·71	·71	·90	·84	·75	·83	·93	·80	·65	·62	·57	·54	?	·81	
					Difference ..	..	−·06	·00	·00	−·03	−·01	+·06	+·04	+·01	−·05	−·03	·00	−·01	−·05	−·05	−·06	..	·00	

Digitized by Google

ABSTRACT TABLE 13.

SURFACE, MID-DEPTH, AND BED VELOCITY-CURVES—ABSTRACT OF RESULTS.

This Table is an Abstract of the Detailed Tables XXIX. to XXXIII. with additions.

The upper line of each Series shows the "Mean Results"; the second line shows the "Ranges" of the Results.

SOLANI SITES.	1 Detailed Table.	1 Serial No.	1 Number of Sets.	2 Gauge-Reading. A or H	2 Hyd. Mean Depth. R	2 Surface-Breadth. s	2 FLOATS. Hub-Float. Wood (W), Copper (C).	2 FLOATS. Length of Connector.	3 SURFACE-FALL. Upper 5 Miles. F_1	3 SURFACE-FALL. Lower 4½ Miles. F_2	3 SURFACE-FALL. Surface Slope. [Right or Left Bank] S	4 AVERAGE WIND. Direction.	4 AVERAGE WIND. Velocity.	6 Central Velocity. v₀	7 SUPL. DISCHARGE in sq. ft. per sec. D	8 MEAN VELOCITY. U	8 Ratio U ÷ v₀. c	TRANSVERSAL.
L. AQUEDUCT.	XXIX.	51	15	8·97	7·42	83·7	Surface-Floats—3″ × ¼″ pine Discs.	No Connector used.	5·76	4·93	?	SSW	3	4·24	329·1	3·87	·913	SURFACE.
				·15	·09	·2			·05	·15				·24	22·2	·26	..	
		52	14	8·83	7·33	83·8			5·73	4·84	?	SSW	3	4·23	326·7	3·84	·908	
				·15	·10	·2			·05	·20				·48	22·6	·27	..	
RIGHT AQUEDUCT.	XXX.	53	16	9·90	7·92	82·0			6·04	5·44	180 R	NE	2	4·76	367·8	4·33	·910	
				·13	·05	·5			·18	·23	030			·78	45·5	·54	..	
		54	4	9·10	7·50	83·4			5·68	5·08	?	NW ♭ W	5	4·19	328·7	3·87	·924	
				·20	·12	·3			·10	·10				·38	5·0	·06	..	
		55	1	8·78	7·30	83·9			5·92	4·88	?	SSW	13	4·05	320·9	3·78	·933	
	XXXI.	56	16	8·71	7·25	83·9			5·73	4·71	?	SSW	2	4·19	321·7	3·79	·905	
				·15	·10	·1			·15	·15				·79	33·4	·40	..	
		57	16	8·55	7·15	84·1			6·12	4·66	?220 R	W ♭ N	1	4·49	352·9	4·15	·924	
				·12	·08	·1			·55	·55	?055			·89	41·5	·49	..	
		58	14	8·07	6·81	84·4			6·17	4·27	?195 R	S ♭ W	1	4·38	345·0	4·06	·927	
				·27	·20	·1			1·43	·78	?115			·98	53·2	·63	..	
		59	3	7·57	6·46	84·5			?6·03	4·07	?	S ♭ W	7	4·17	333·8	3·93	·942	
				·20	·15	·0			?·20	·20				·63	18·1	·21	..	
EMBANKMENT [Minor Sites.]	XXXIII.	60	10	9·59	?	168·4			5·73	4·92	?	ESE	3	4·24	685·2	4·08	·962	
				·16		1·2			·05	·10				·65	46·5	·27	..	
R. AQUED.	XXXII.	61	16	10·00	7·98	82·0	C	5	5·93	5·57	?	NE	2	4·61	365·1	4·29	·930	MID-DEPTH.
				·24	·15	0			·37	·19				·62	37·7	·44	..	
		62	1	9·05	7·47	83·5	C	4½	5·80	4·70	?	SW ♭ S	11	4·32	350·9	4·13	·956	
R. AQUEDUCT.	XXXII.	65	3	10·00	7·99	82.0	C	10	6·08	5·52	?	NE ♭ E	4	4·50	357·6	4·21	·936	BED.
				·00	·00	·0			·00	·05				·07	5·4	·06	..	
		66	4	8·77	7·29	83·9	W	8	5·81	4·85	?	SW ♭ W	5	3·65	294·7	3·47	·950	
				·30	·20	·3			·17	·25				·13	7·2	·09	..	

Digitized by Google

MEAN VELOCITY-CURVES—ABSTRACT OF RESULTS.

This Table is an Abstract of the Detailed Tables XXXIV., XXXV., XLI., LVI. with additions.
The upper line of each Series shows the "Mean Results"; the second line shows the "Ranges" of the Results.

SITES.	1 Detailed Table.	1 Serial No.	1 Number of Sets.	2 Gauge-Reading. A or H	2 Hyd. Mean Depth. R	2 Surface-Breadth. b	2 Rod. Wood (W), Tin (T).	2 Rod. Length. l	3 Surface-Fall. Upper 5 miles. F_1	3 Surface-Fall. Lower 4½ miles. F_2	3 Surface-Slope. [Right or Left Bank.] S	4 Average Wind. Direction.	4 Average Wind. Velocity.	6 Mean Velocity past centre vertical. U_o	7 Cubic Discharge. D	8 Mean Velocity. V	8 Ratio $V \div U_o$. c
SOLANI LEFT AQUEDUCT.	XXXIV.	101	3	9·90	7·94	82·2	T	9·0	5·92	5·49	189 L	SE ♭ E	1	4·31	3,427	4·06	·942
				·17	·08	·5		·0	·08	·14	012			·24	32	·09	..
		102	12	9·63	7·79	82·5	W	9·0	5·64	5·45	?	Calm		3·74	2,922	3·57	·955
				·25	·16	·0		·0	·25	·25				·63	209	·26	..
		103	4	9·42	7·65	82·5	T	8·9	5·91	5·05	207 L	SW ♭ W	3	3·96	3,093	3·87	·977
				·11	·07	·0		·5	·16	·51	017			·42	92	·09	..
	XXXV.	104	12	9·05	7·47	83·5	W	8·5	5·70	5·12	?	N	1	3·80	2,771	3·61	·950
				·25	·15	·3		·0	·30	·15				·47	202	·16	..
		105	2	8·61	7·19	84·0	T	8·0	5·89	4·64	222 L	W ♭ N	2	3·81	2,705	3·70	·971
				·13	·09	·1		·0	·07	·20	007			·29	152	·16	..
		106	6	8·02	6·78	85·0	T	7·5	5·88	4·27	?206 L	S ♭ E	4	3·61	2,361	3·47	·961
				·22	·15	·0		·0	·17	·22	?032			·27	238	·20	..
		107	6	7·50	6·41	85·0	T	7·0	5·92	3·94	?225 L	WSW	1	3·54	2,189	3·43	·969
				·13	·10	·0		·0	·15	·08	?015			·29	99	·13	..
SOLANI RIGHT AQUEDUCT. [Left Aqueduct closed].	XLI.	131	2	4·60	4·20	85·0	T	4·0	3·60	·10	025 R	SW	2	1·33	481·9	1·24	·932
				·00	·00	·0		·0	·00	·00	002			·08	19·5	·05	..
		132	2	3·96	3·65	85·0	T	3·0	6·17	·96	473 R	Calm		5·15	1,623	4·83	·938
				·05	·04	·0		·0	·00	·05	015			·04	51	·09	..
		133	1	3·60	3·35	85·0	T	3·0	4·35	·00	?	NE	5	·71	212·0	·69	·972
		134	1	3·58	3·33	85·0	T	3·0	6·22	·88	?	SW ♭ S	10	3·70	979·3	3·22	·870
		135	1	3·18	2·99	85·0	T	2·5	6·22	·68	253 R	Calm		3·57	865·6	3·20	·896
		136	1	3·12	2·94	85·0	T	2·5	6·28	·62	208 R	Calm		3·19	740·2	2·79	·875
		137	1	3·13	2·94	85·0	T	3·0	6·47	·43	200 R	SW	6	2·68	667·8	2·51	·937
		138	1	2·88	2·72	85·0	T	2·0	6·52	·18	145 R	Calm		2·76	620·7	2·54	·920
		139	2	2·66	2·52	85·0	T	2·0	5·95	·16	151 R	S	1	2·47	496·3	2·20	·891
				·11	·10	·0		·0	·11	·11	035			·19	58·6	·17	..
DISTRIBUTARIES. Mirânpur. Mansûrpur.	LVI. Right Jaoli.	231	2	4·35	2·79	25·0	T	..	No Observations.			Calm		2·67	190·9	2·52	·944
				·01	·00	·0								·12	·4	·01	..
		232	2	3·10	1·99	22·0	T	..				Calm		2·32	97·7	2·10	·905
				·01	·01	·0								·16	.0	·00	..
	Mansûrpur.	233	4	3·97	2·32	14·2	T	..	No Observations.			N	l	2·36	86·4	2·10	·890
				·23	·07	·3								·22	9·9	·11	..
		234	1	3·60	2·10	13·8	T	..				Calm		2·29	72·6	2·05	·895
	Mirânpur.	235	1	3·75	1·63	14·0	T	..	No Observations.			Calm		1·67	41·4	1·59	·952
		236	2	2·83	1·16	13·5	T	..				WNW	b	1·59	25·5	1·49	·937
				·00	·00	·0								·02	·4	·00	..
	Pîmora	237	2	3·79	2·16	13·0	T	..	No Observations.			NW	b	2·11	63·1	1·83	·867
				·01	·00	·0								·05	·5	·02	..
		238	2	3 33	1·94	12·5	T	..				W	l	1·98	50·0	1·75	·884
				·09	·05	·0								·11	4·3	·08	..

Digitized by Google

MEAN VELOCITY-CURVES—ABSTRACT OF RESULTS.

This Table is an Abstract of the Detailed Tables XXXVI. to XL. with additions.

The upper line of each Series shows the "Mean Results"; the second line shows the "Ranges" of the Results.

SITE.	1			2					3			4		6	7	8	
	Detailed Table.	Serial No.	Number of Sets.	Gauge-Reading.	Hyd. Mean Depth.	Surface-Breadth.	Rod. Wood (W), Tin (T).	Rod. Length.	Surface-Fall. Upper b miles.	Surface-Fall. Lower 4½ miles.	Surface-Slope, Right Bank.	Average Wind. Direction.	Average Wind. Velocity.	Mean Velocity past centre vertical.	Cubic Discharge.	Mean Velocity.	Ratio $V \div U_0$.
				H	R	b	w	l	F_1	F_3	S			U_0	D	V	c
SOLANI RIGHT AQUEDUCT.	XXXVI.	108	19	9·96 ·19	7·96 ·11	82·0 ·5	T	9·3 ·5	5·85 ·24	5·61 ·28	?189 ?030	NE b E	1	4·21 ·51	3,384 387	4·00 ·45	·950 ..
	XXXVII.	109	18	9·61 ·18	7·78 ·12	82·5 ·0	T	9·0 ·0	5·91 ·43	5·24 ·64	?193 ?018	NE b E	3	4·16 ·89	3,231 513	3·95 ·61	·950 ..
		110	20	9·33 ·17	7·61 ·07	82·8 ·6	W * T	9·0 ·5	5·86 ·46	5·22 ·39	?193 ?022	N	1	3·98 ·71	3,035 547	3·83 ·63	·962 ..
		111	16	8·97 ·16	7·42 ·10	83·7 ·2	T	8·3 ·5	5·91 ·59	?4·87 ?·54	?195 ?023	N b W	1	4·03 ·64	2,941 284	3·86 ·37	·958 ..
	XXXVIII.	112	18	8·58 ·26	7·16 ·17	84·1 ·2	T	8·0 ·0	5·85 ·19	4·71 ·39	?208 ?027	NW b W	1	3·92 ·63	2,716 256	3·73 ·29	·952 ..
		113	1	8·16	6·88	84·3	T	7·5	5·84	4·36	228	V	l	4·29	2,669	3·85	·897
		114	20	7·98 ·16	6·75 ·11	84·4 ·0	T	7·1 ·5	5·85 ·23	4·28 ·18	?204 ?015	SSW	3	3·76 ·50	2,438 199	3·60 ·29	·957 ..
	XXXIX.	115	1	7·80	6·63	84·4	T	7·0	6·10	4·10	198	Calm		3·95	2,561	3·86	·977
		116	7	7·49 ·16	6·41 ·12	84·5 ·0	T	7·0 ·0	5·95 ·21	3·79 1·11	?207 ?010	NW b W	1	3·79 ·43	2,275 223	3·59 ·17	·947 ..
		117	2	7·09 ·02	6·14 ·02	85·0 ·0	T	6·3 ·5	6·06 ·12	3·19 1·18	220 021	NE b N	2	3·81 ·02	2,208 73	3·67 ·13	·963 ..
		118	16	6·67 ·23	5·83 ·17	85·0 ·0	T	6·0 ·0	5·99 ·12	3·21 ·49	?223 ?015	S	4	3·76 ·40	2,037 155	3·59 ·17	·955 ..
		119	7	6·15 ·30	5·43 ·23	85·0 ·0	T	5·4 ·5	6·53 ·67	2·61 1·12	245 133	NNE	1	3·89 ·28	1,954 243	3·74 ·48	·961 ..
	XL.	120	9	5·78 ·30	5·14 ·24	85·0 ·0	T	5·3 ·5	5·89 ·20	2·20 ·91	?	SSW	3	3·35 ·42	1,584 143	3·23 ·34	·964 ..
		121	2	5·61 ·05	5·00 ·04	85·0 ·0	T	5·0 ·0	6·25 ·15	2·31 1·55	240 120	S	2	3·57 ·36	1,653 12	3·43 ·06	·961 ..
		122	13	4·48 ·24	4·10 ·20	85·0 ·0	T	4·0 ·5	5·82 1·26	?1·81 ?·53	?235 ?135	S b E	5	3·05 ·75	1,106 213	2·90 ·66	·951 ..
		123	1	3·65	3·40	85·0	T	3·0	4·30	·05	?	Calm		·72	218·9	·71	·986
		124	1	3·49	3·26	85·0	T	3·0	6·61	1·29	195	N	5	2·60	722·2	2·43	·935
		125	1	2·02	1·95	85·0	T	1·5	7·78	·42	203	S	l	1·65	276·9	1·61	·976
		126	1	1·92	1·85	85·0	T	1·5	5·93	?·38	?	S	6	1·20	202·8	1·24	1·033
		127	1	·70	·69	84·3	W	·5	7·40	?·00	113	S	10	·57	35·6	·60	1·053

* 12 Sets with wood Rods, 8 Sets with tin Rods.

Digitized by Google

MEAN VELOCITY-CURVES—ABSTRACT OF RESULTS.

This Table is an Abstract of the Detailed Tables XLII. to XLVI. with additions.

The upper line of each Series shows the "Mean Results"; the second line shows the "Ranges" of the Results.

SITE.	1			2				3				4		6	7	8	
	Detailed Table.	Serial No.	Number of Sets.	Gauge-Reading.	Hyd. Mean Depth.	Surface-Breadth.	Rod. T'n (T).	Surface-Fall. Upper 4 miles.	1 mile below Site	Lower 4½ miles.	Surface-Slope. (Left Bank).	Average Wind. Direction.	Velocity.	Mean Velocity past centre vertical.	Cubic Discharge.	Mean Velocity.	Ratio $V \div U_0$.
				A	B	b		F_1	F_2	F_3	S			U_0	D	V	c
SOLANI EMBANKMENT, MAIN SITE.	XLII.	151	5	9·94	9·34	170·1	T	4·70	1·25	5·46	227	ESE	4	4·28	7,170	4·02	·939
				·16	·07	1·2		·09	·10	·20	007			·68	424	·20	..
		152	17	9·91	9·17	170·3	T	4·79	1·15	5·94	?206	S ð E	3	4·01	6,725	3·83	·955
				·26	·15	2·3		·13	·20	·10	?024			·65	545	·26	..
		153	6	9·52	8·96	168·7	T	4·72	1·21	5·16	?227	SW ð W	2	3·88	6,276	3·71	·956
				·28	·21	·0		·21	·19	·72	?062			·23	436	·20	..
	XLIII.	154	5	9·08	8·68	167·0	T	4·71	1·32	4·83	?229	SW ð W	4	3·85	5,974	3·70	·961
				·18	·18	1·2		·14	·13	·12	?038			·39	425	·18	..
		155	6	8·74	8·42	166·3	T	4·72	1·26	4·65	217	W	5	3·84	5,564	3·58	·932
				·29	·24	·0		·40	·14	·30	049			·79	1,141	·63	..
		156	4	8·43	8·23	165·2	T	3·90	2·07	3·93	?223	NE	3	3·37	4,882	3·24	·961
				·06	·04	·0		·08	·03	·08	?			·52	268	·17	..
		157	7	8·12	8·01	164·0	T	4·63	1·27	4·27	?212	W	1	3·50	4,832	3·32	·949
				·19	·16	·0		·07	·14	·23	?028			·64	476	·26	..
		158	2	7·90	7·84	164·0	T	4·81	1·25	4·23	215	W	3	3·79	4,860	3·43	·905
				·10	·08	·0		·15	·15	·25	000			·03	65	·01	..
	XLIV.	159	9	7·59	7·64	162·6	T	4·80	1·25	3·95	?214	WSW	3	3·42	4,459	3·26	·953
				·22	·13	1·2		1·07	·19	·15	?010			·55	590	·35	..
		160	6	7·06	7·26	161·3	T	4·67	1·32	3·52	214	W ð S	4	3·30	4,120	3·22	·976
				·27	·18	1·2		·18	·07	·22	010			·33	91	·10	..
		161	11	6·82	7·12	159·3	T	4·68	1·27	3·39	?217	SSE	4	3·28	3,868	3·11	·948
				·15	·12	·0		·08	·08	·55	?006			·38	155	·11	..
	XLV.	162	5	6·38	6·78	159·3	T	5·10	1·14	3·15	221	SE ð E	2	3·46	3,973	3·39	·980
				·26	·22	·0		·33	·17	·30	123			·45	342	·37	..
		163	6	5·58	6·18	157·0	T	5·11	1·23	2·62	171	WSW	2	3·34	3,194	3·05	·913
				·15	·12	·0		·10	·01	·14	050			·42	287	·20	..
		164	1	5·24	5·98	154·7	T	5·29	1·72	2·49	?	NW ð W	4	2·87	2,715	2·73	·951
		165	6	4·96	5·74	154·7	T	4·69	·94	1·47	?163	N ð E	1	2·64	2,432	2·56	·970
				·15	·13	·0		·49	·53	1·12	?040			·21	520	·49	..
		166	3	4·41	5·35	152·3	T	4·45	1·10	1·75	?	ESE	3	2·54	2,061	2·37	·933
				·27	·23	·0		·17	·35	·65	?			·11	149	·07	..
	XLVI.	167	10	4·01	5·01	151·5	T	4·65	·91	1·74	?195	SSW	5	2·18	1,722	2·14	·982
				·17	·11	1·2		·59	·35	1·00	?020			·49	94	·14	..
		168	1	3·98	5·00	151·2	T	4·45	·65	·60	?	E ð N	13	1·72	1,350	1·69	·983
		169	10	3·74	4·83	150·0	T	4·64	1·12	·87	?200	E	3	1·84	1,444	1·89	1·027
				·09	·08	·0		·39	·60	1·35	?000			·52	261	·35	..
		170	2	3·64	4·73	150·0	T	4·10	·63	·48	?165	SE ð S	1	1·43	1,124	1·50	1·049
				·01	·01	·0		·61	·14	·25	?			·15	56	·08	..

Digitized by Google

MEAN VELOCITY-CURVES—ABSTRACT OF RESULTS.

This Table is an Abstract of the Detailed Tables XLVII. to XLIX. with additions.

The upper line of each Series shows the "Mean Results"; the second line shows the "Ranges" of the Results.

SITES.	1			2				3				4		6	7	8	
	Detailed Table.	Serial No.	Number of Sets.	Gauge-Reading.	Hyd. Mean Depth.	Surface-Breadth.	Wood (W), Tin (T), ROD	Surface-Fall. Upper Sub-Reach	Middle Sub-Reach	Lower Sub-Reach	Surface-Slope (Left & Both Banks)	Average Wind. Direction.	Velocity.	Mean Velocity past centre vertical.	Cubic Discharge.	Mean Velocity.	Ratio $V \div U_o$.
				h	R	b		F_1	F_2	F_3	S			U_o	D	V	σ
SOLANI EMBANKMENT, MAIN SITE.	XLVII.	171	3	3·62	4·72	150·0	T	3·65	·24	·05	?038 L	S	9	·84	643·2	·86	1·024
				·10	·08	·0		·04	·00	·10	?			·11	104·2	·12	..
		172	2	3·58	4·68	150·0	T	3·41	·20	·05	?	SSW	3	·67	483·3	·66	·985
				·13	·11	·0		·03	·13	·00				·15	65·9	·07	..
		173	5	3·47	3·86	150·0	T	4·29	·41	·09	088 L	E b S	3	1·36	820·5	1·35	·993
				·05	·04	·0		·10	·02	·05	010			·11	58·3	·09	..
		174	1	3·04	4·20	150·0	T	4·59	·51	·60	125 L	..	0	1·38	887·6	1·34	·971
		175	5	2·90	4·07	150·0	T	5·03	1·17	1·40	215 L	W b N	2	1·67	1,142	1·79	1·072
				·05	·04	·0		·05	·05	·00	000			·05	34	·07	..
	XLVIII.	176	2	2·83	3·28	150·0	T	5·03	·70	·30	?242 L	E b N	6	1·64	839·9	1·65	1·006
				·01	·01	·0		·06	·01	·00	?163			·06	5·6	·00	..
		177	4	2·42	3·64	150·0	T	5·02	1·08	1·15	?193 L	E b N	9	1·40	852·9	1·50	1·071
				·16	·15	·0		·12	·17	·32	?015			·14	116·4	·16	..
		178	2	2·43	3·64	150·0	T	4·36	·32	·18	?	SSE	4	·75	457·7	·81	1·080
				·25	·22	·0		·55	·10	·15				·05	24·9	·10	..
		179	4	1·92	3·18	150·0	T	5·19	1·07	·88	?180 L	ENE	1	1·15	626·0	1·27	1·104
				·16	·15	·0		·01	·11	·05	?			·09	93·4	·13	..
		180	2	1·67	2·26	150·0	T	5·72	·39	·10	148 L	NW	2	·98	300·9	·87	·888
				·05	·04	·0		·35	·35	·00	050			·06	28·3	·06	..
		181	1	·35	1·69	150·0	W * T	7·58	·59	?·06	090 L	S	6	·41	114·1	·44	1·073
FIFTEENTH MILE. Old Site.	XLIX.	191	1	15·31	9·49	174·9	T	2·28	3·63	5·54	240 L	NE	2	4·55	7,187	4·16	·914
		192	6	14·32	8·64	174·9	T	2·26	3·65	4·87	231 L	N	2	4·25	6,199	3·98	·936
				·07	·06	·0		·05	·08	·10	033			·70	602	·39	..
		193	3	13·99	8·35	174·9	T	2·30	3·60	4·73	227 L	NNW	2	4·05	5,786	3·87	·956
				·08	·07	·0		·08	·08	·05	007			·11	114	·04	..
		194	2	13·60	8·02	174·9	T	2·27	3·66	4·40	231 L	SW	1	4·17	5,622	3·93	·942
				·24	·21	·0		·01	·06	·30	005			·00	179	·01	..
		195	1	12·53	7·13	171·3	T	2·06	3·79	3·65	?	N	2	3·66	4,370	3·51	·959
New Site.		196	3	15·16	8·67	185·9	T	2·26	3·65	5·37	?221 Both Banks	W	1	4·35	6,857	4·12	·947
				·10	·08	·3		·07	·07	·22	?011			·22	115	·03	..
		197	1	14·69	8·35	184·2	T	2·19	3·66	5·20	220	SW	7	4·29	6,287	3·98	·928

* Wood Rods < 1′ long, Tin Rods of 1′ and 1½′ length.

Digitized by Google

MEAN VELOCITY-CURVES—ABSTRACT OF RESULTS.

This Table is an Abstract of the Detailed Tables L. to LV. with additions.

The upper line of each Series shows the "Mean Results"; the second line shows the "Ranges" of the Results.

Sites.	1			2				3			4		6	7	8		9
	Detailed Table.	Serial No.	Number of Sets.	Gauge-Reading.	Hyd. Mean Depth.	Surface-Breadth.	Rod Tin (T).	Surface-Fall: Upper Sub-Reach	Surface-Fall: Lower Sub-Reach	Surface-Fall: Surface-Slope. (Both Reaches.)	Average Wind. Direction.	Average Wind. Velocity.	Mean Velocity past centre vertical.	Cubic Discharge.	Mean Velocity.	Ratio $V \div U_o$.	Silt Density (on centre vertical).
				A	B	b		F_1	F_2	S			U_o	D	V	c	σ
BEIRA.	L.	201	5	7·44	9·02	188·4	T	?·70	?3·98	191	S	1	3·24	5,611	3·17	·978	?319
				·25	·26	·2		?	?	025			·31	398	·27	..	?954
		202	7	7·03	8·72	188·0	T	?·82	?3·70	200	NNW	2	3·19	5,329	3·12	·978	600
				·26	·23	·3		?	?	030			·38	282	·19	..	2,918
		203	9	6·80	8·47	187·8	T	?·90	?3·51	?191	S	1	3·19	5,112	3·09	·969	436
				·20	·33	·2		?·63	?·31	?050			·64	558	·29	..	948
	Lf.	204	14	6·49	8·21	187·5	T	·79	3·23	198	N	1	3·07	4,810	3·01	·980	304
				·26	·20	·3		·83	·56	075			·47	223	·20	..	1,203
		205	6	6·30	7·96	187·3	T	·87	3·15	208	NW ♭ N	1	3·10	4,766	3·07	·990	202
				·16	·28	·2		·35	·40	020			·26	108	·04	..	495
		206	12	5·84	7·60	186·8	T	·79	2·74	?200	N ♭ E	1	2·99	4,292	2·92	·977	601
				·30	·31	·3		·34	·70	?030			·64	518	·27	..	5,185
JAOUÍ.	LII.	211	9	7·21	7·82	192·8	T	·39	?5·49	?174	NW ♭ W	2	3·05	4,631	2·96	·970	Not observed.
				·25	·27	·3		·23	·16	?032			·50	397	·19	..	
		212	6	6·71	7·46	192·3	T	·32	5·14	160	W ♭ S	5	3·05	4,357	2·94	·964	
				·26	·28	·2		·06	·12	026			·51	353	·23	..	
		213	7	6·45	7·22	192·0	T	·29	4·80	?148	N ♭ W	2	3·04	4,105	2·87	·944	
				·26	·38	·2		·12	·96	?029			·35	286	·21	..	
		214	8	6·21	7·05	191·8	T	·28	4·70	146	WNW	9	2·94	3,929	2·81	·956	
				·18	·16	·1		·09	·66	030			·44	184	·15	..	
	LIII.	215	10	5·97	6·79	191·5	T	·25	4·53	145	W ♭ S	7	2·93	3,740	2·80	·956	
				·25	·32	·2		·23	1·09	037			·35	358	·27	..	
		216	9	5·64	6·53	191·2	T	·27	4·19	144	W ♭ N	7	2·91	3,478	2·70	·928	
				·22	·21	·2		·20	·74	030			·45	362	·27	..	
		217	6	5·36	6·32	190·9	T	·21	3·76	140	WSW	6	2·84	3,259	2·63	·926	
				·21	·17	·2		·05	·77	011			·24	92	·04	..	
KAMHERA.	LIV.	221	4	6·46	4·84	65·5	T	2·83	11·80	295	NNW	9	3·09	960·6	2·86	·926	Not observed.
				·22	·17	·2		·08	·21	008			·43	35·8	·05	..	
		222	15	6·07	4·50	65·2	T	2·97	11·54	291	N ♭ W	6	2·94	871·0	2·82	·959	
				·23	·34	1·4		·30	·23	041			·51	96·8	·22	..	
		223	11	5·79	4·37	64·8	T	2·84	11·24	297	NNW	9	2·88	831·5	2·79	·969	
				·24	·33	1·2		·40	·78	028			·56	75·5	·26	..	
	LV.	224	12	5·53	4·18	64·3	T	2·79	11·12	304	NNW	4	2·91	772·7	2·74	·942	
				·16	·12	·5		·26	·25	022			·28	64·9	·21	..	
		225	14	5·34	4·07	64·0	T	2·73	10·64	306	N ♭ W	3	2·77	739·4	2·71	·978	
				·14	·13	·5		·13	·82	019			·54	65·5	·16	..	

Digitized by Google

ABSTRACT TABLE 19.

TRIAL TRANSVERSE CURVES.

Length of Base-Transversal = $2b$, from $y = -b$ to $y = +b$. Abscisse (y) are reckoned of same sign as b, so that $\frac{y}{b}$ is always +.

The Table shows the values of the ordinates $\left(\frac{v}{v_o}\right)$ corresponding to the fractional abscisse $\left(\frac{y}{b}\right)$.

$\frac{y}{b}$	Parabolic, $\frac{v}{v_o} = 1 - m \cdot \left(\frac{y}{b}\right)^n$, when $m = 1$.								Elliptic, $\left(\frac{v}{v_o}\right)^n + m \cdot \left(\frac{y}{b}\right)^n = 1$, when $m = 1$.					Exponential.			Equations.
	$n=1$	$n=\frac{3}{2}$	$n=2$	$n=3$	$n=4$	$n=5$	$n=6$	$n=8$	$n=1$	$n=2$	$n=3$	$n=4$	$n=6$	Logarithmic	Error.	Catenary.	
·0	1·00	1·0000	1·0000	1·0000	1·0000	1·0000	1·0000	1·0000	1·00	1·000	1·000	1·000	1·000	1·0000	1·0000	1·0000	
·1	·90	·9684	·9900	·9990	·9999	1·0000	1·0000	1·0000	·90	·995	1·000	1·000	1·000	·9048	·9901	·9950	
·2	·80	·9106	·9600	·9920	·9984	·9997	·9999	1·0000	·80	·980	·997	1·000	1·000	·8187	·9608	·9799	
·3	·70	·8357	·9100	·9730	·9919	·9976	·9993	·9999	·70	·954	·991	·998	1·000	·7408	·9139	·9546	
·4	·60	·7470	·8400	·9360	·9744	·9898	·9959	·9993	·60	·917	·978	·994	·999	·6703	·8521	·9199	
·5	·50	·6464	·7500	·8750	·9375	·9687	·9844	·9961	·50	·866	·956	·984	·997	·6065	·7788	·8724	
·6	·40	·5351	·6400	·7840	·8704	·9222	·9533	·9832	·40	·800	·922	·966	·992	·5488	·6977	·8145	
·7	·30	·4143	·5100	·6570	·7599	·8319	·8824	·9424	·30	·714	·869	·934	·979	·4966	·6126	·7448	
·75	·25	·3505	·4375	·5781	·6836	·7627	·8220	·8999	·25	·661	·833	·909	·968	·4724	·5698	·7053	
·8	·20	·2845	·3600	·4880	·5904	·6723	·7379	·8322	·20	·600	·787	·877	·951	·4493	·5273	·6626	
·85	·15	·2163	·2775	·3859	·4780	·5563	·6228	·7275	·15	·527	·728	·832	·924	·4274	·4855	·6165	
·9	·10	·1462	·1900	·2710	·3439	·4095	·4686	·5695	·10	·436	·647	·766	·881	·4066	·4449	·5669	
·95	·05	·0741	·0975	·1426	·1855	·2262	·2649	·3366	·05	·312	·523	·656	·801	·3867	·4056	·5138	
·96	·04	·0594	·0784	·1153	·1507	·1846	·2172	·2787	·04	·280	·487	·623	·775	·3829	·3979	·5027	
·97	·03	·0447	·0591	·0873	·1147	·1413	·1670	·2162	·03	·243	·444	·582	·742	·3791	·3100	·4915	
·98	·02	·0298	·0396	·0588	·0776	·0961	·1142	·1492	·02	·191	·389	·528	·696	·3753	·3040	·4801	
·99	·01	·0150	·0199	·0297	·0394	·0490	·0585	·0772	·01	·141	·310	·446	·623	·3716	·2981	·4686	
1·00	·00	·0000	·0000	·0000	·0000	·0000	·0000	·0000	·00	·000	·000	·000	·000	·3679	·3679	·4569	

Logarithmic curve, $\frac{v}{v_o} = m \cdot \varepsilon^{-\eta}$, when $m = 1$.

Error Curve, $\frac{v}{v_o} = m \cdot \varepsilon^{-\eta^2}$, when $m = 1$.

Catenary, $\frac{v}{v_o} = m \cdot \left\{2 - \frac{1}{2}\left(\varepsilon^{\eta} + \varepsilon^{-\eta}\right)\right\}$, when $m = 1$.

[Here η is printed for shortness for $\left(\frac{y}{b}\right)$.]

Digitized by Google

CENTRAL SURFACE AND MEAN VELOCITIES—ABSTRACT OF RESULTS. **ABSTRACT TABLE 20.**

This Table is an Abstract from the Detailed Comparison Tables LVIII. to LXI. with the addition of Bazin's and Kutter's Co-efficients.

Two lines are in general devoted to each Series. The upper line shows the "Mean Results" throughout; in Series of more than one Set the second line (old brevier type, *e.g.* 137) shows the "Ranges."

1		2								3						4						5						
SITE.	Serial No.	Number of Sets (Cols. 3, 5).	CONTROL. Head of Reach. Gates open in Dam.	Head of Reach. Ogees open in Dam.	Head of Reach. Gates closed in Regulator.	Tail of Reach. Withdrawn by Distributaries. Q	Tail of Reach. Average Obstruction. k	SURFACE-FALL. Upper 5 miles. F_1	SURFACE-FALL. Lower 4½ miles. F_3	ROD-VELOCITY RESULTS. Hyd. Mean Depth. R	Surface-Breadth. b	Length of Rod. l	AVERAGE WIND. Direction.	AVERAGE WIND. Velocity.	DUBIO DISCHARGE in cub. feet per sec. D	MEAN VELOCITY. V	CENTRAL SURFACE-VELOCITY RESULTS. Number of Sets.	Hyd. Mean Depth. R	AVERAGE WIND. Direction.	AVERAGE WIND. Velocity.	CENTRAL SURFACE VELOCITY. v_o	Ratio $V \div v_o$. Expert. c	Ratio $V \div v_o$. Bazin's Rule. c_b	SURFACE-SLOPE RESULTS. Hyd. Mean Depth. R	AVERAGE WIND. Direction.	AVERAGE WIND. Velocity.	Surface-Slope [L or R. Bank]. S	Value of $100\sqrt{RS}$. w	Ratio $V \div w$. Expert. C	Ratio $V \div w$. Bazin's. C_b	Ratio $V \div w$. Kutter's C_k
SOLANI LEFT AQUEDUCT.	101	3	0 0	0	241	·00	5·92	5·49	7·94	82·2	9	SE *b* E	1	3,426	4·06								7·94	NE	1	189 L	3·88	1·048	1·11	1·050
			0 0	0	38	·00	·08	·14	·08	·5	0			32	·09								·07			012	·11	·014	..	..
	103	4	0 0	0	133	·00	5·91	5·05	7·65	82·5	8·9	SW *b* W	3	3,094	3·87	..	No Observations.				..		7·64	SSW	4	207 L	3·98	·978	1·11	1·041
			0 0	0	53	·00	·16	·51	·07	·0	·5			92	·09								·07			017	·17	·057	..	..
	105	2	0 0	0	73	·00	5·90	4·64	7·19	84·1	8	W *b* N	2	2,705	3·70								7·21	NW	1	222 L	4·00	·926	1·10	1·032
			0 0	0	146	·00	·07	·20	·09	·1	0			152	·16								·05			007	·07	·024	..	..
	106	3	0 ~~2~~	0	57	·00	5·86	4·29	6·81	85·0	7·5	SE	2	2,890	3·49	1	6·75	N *b* E	4	4·05	·847	·786	6·81	SE	3	206 L	3·74	·933	1·10	1·024
			0 2	0	113	·00	·11	·19	·15	·0	·0			137	·11								·15			32	·34	·055	..	..
	107	4	0 0	0	0	·00	5·91	3·93	6·43	85·0	7	SW *b* W	1	2,213	3·46	..	No Observations.				..		6·43	SSW	4	225 L	3·81	·909	1·10	1·014
			0 0	0	0	·00	·05	·06	·05	·0	0			47	·06								·04			015	·11	·028	..	..
AQUEDUCT. open.	108	10	0 ½	0	233	?·00	5·86	?5·59	7·96	82·1	9·2	NE	1	3,429	4·06	7	7·97	ENE	1	4·52	·884	·805	7·96	SW	2	190 R	3·89	1·045	1·11	1·050
			0 2	0	208	?·00	·17	?·28	·10	·5	·5			338	·39		·10			·16	·047	..				030	·29	·145	..	..
	109	1	0 0	0	318	·00	6·07	5·23	7·82	82·5	9	S *b* W	4	3,577	4·35	..	No Observations.				..		7·80	Calm.		198 R	3·93	1·107	1·11	1·046
	109	9	0 ~~5~~	0	212	?·00	5·86	5·26	7·76	82·5	9	NE *b* E	5	3,164	3·88	8	7·77	NE	2	4·44	·874	·799	7·76	E	3	192 R	3·86	1·006	1·11	1·046
			0 3	0	244	?·00	·34	·62	·10	·0	0			312	·34		·10			·41	·060	..				018	·19	·056	..	..
	110	1	0 0	0	333	·00	6·21	4·94	7·63	82·5	8·5	Calm.		3,385	4·24	1	7·66	V	*l*	4·78	·887	·809	7·67	V	*l*	203 R	3·95	1·073	1·11	1·042
	110	10	0 2	0	200	?·00	5·87	5·23	7·62	82·8	9	SSW	*l*	3,049	3·85	7	7·63	Calm.		4·34	·877	·798	7·64	SW	3	193 R	3·84	1·004	1·11	1·043
			0 5	0	174	?·00	·33	·25	·07	·7	5			285	·27		·20			·23	·053	..				020	·16	·091	..	..
	110	1	0 0	0	0	·00	5·75	5·10	7·58	83·1	9	N	7	2,838	3·61	1	7·58	Calm.		4·39	·822	·793	7·58	Calm.		183 R	3·73	·968	1·11	1·044
	111	3	0 0	0	146	?·00	5·91	4·87	7·43	83·6	8·3	NE *b* N	2	2,950	3·87	6	7·42	NW	1	4·40	·885	·801	7·48	NW	2	193 R	3·79	1·021	1·11	1·039
			0 0	0	305	?·00	·19	·52	·08	·1	·5			263	·37		·07			·29	·046	..				023	·22	·092	..	..

Digitized by Google

SOLANI RIGHT AQUEDUCT.
Left Aqueduct closed.

| | | |

ABSTRACT TABLE 21.

CENTRAL SURFACE AND MEAN VELOCITIES—ABSTRACT OF RESULTS.

This Table is an Abstract from the Detailed Comparison Tables LXII. to LXIV. with the addition of Bazin's and Kutter's Co-efficients.

Two lines are in general devoted to each Series. The upper line shows the "Mean Results" throughout; in Series of more than one Set the second line (old brevier type, as 182) shows the "Ranges".

1		2							3						4						5						
			CONTROL.				SURFACE-FALL.			ROD-VELOCITY RESULTS.					CENTRAL SURFACE-VELOCITY RESULTS						SURFACE-SLOPE RESULTS.						
			Head of Reach		Tail of Reach.							AVERAGE WIND.					AVERAGE WIND.			Ratio $V \div v_o$.			AVERAGE WIND.			Ratio $V \div w$.		
SITE.	Serial No.	Number of Sets (Cols. 3, 5).	Gates open in Dam.	Ogees open in Dam.	Withdrawn by Distributaries.	Average Obstruction.	Upper 4 miles.	1 mile below Site.	Lower 4½ miles.	Hyd. Mean Depth.	Surface-Breadth.	Direction.	Velocity.	CUBIC DISCHARGE in cub. feet per sec.	MEAN VELOCITY.	Number of Sets.	Hyd. Mean Depth.	Direction.	Velocity.	CENTRAL SURFACE VELOCITY.	Experl.	Bazin's Rule.	Hyd. Mean Depth.	Direction.	Velocity.	Surface-Slope [Left Bank].	Value of $100\sqrt{RS}$	Experl.	Bazin's.	Kutter's
			Gates closed in Regulator.		Q	k	F_1	F_2	F_3	R	b			D	V		R			v_o	c	c_b	R			S	w	C	C_b	C_k
SOLANI EMBANKMENT MAIN SITE. High Water.	151	5	0	0	0	268	·00	4·70	1·25	5·46	9·34	170·0	ESE	4	7,169	4·02	2	9·35	SE	3	4·66	·881	·775	9·34	ESE	5	227	4·60	·872	·907	·877
			0	0	0	2	·00	·09	·10	·20	·07	1·2			424	·20					·09	·013	..	·09			007	·09	·047	..	..
	152	10	0	5&6	0	226	?·00	4·79	1·15	5·58	9·19	170·6	SSE	4	6,743	3·83	10	9·20	ESE	3	4·52	·849	·777	9·20	Calm.		205	4·34	·884	·905	·877
			0	1	0	162	?·00	·13	·18	·30	·10	1·2			545	·26					·29	·067	..	·15			020	·21	·084	..	..
	153	5	0	5&6	0	149	?·00	4·72	1·20	5·13	8·94	168·7	W *b* S	4	6,212	3·68	4	8·94	W *b* S	6	4·30	·858	·764	8·92	W	4	227	4·50	·821	·901	·871
			0	2	0	183	?·00	·21	·15	·72	·12	·0			132	·08					·50	·102	..	·10			062	·59	·120	..	..
	154	3	0	0	0	206	·00	4·68	1·29	4·84	8·69	167·1	SW *b* S	2	5,974	3·71	2	8·71	S	3	4·47	·833	·767	8·69	V	1	229	4·46	·832	·897	·868
			0	0	0	182	·00	·10	·02	·12	·13	1·2			425	·18					·23	·002	..	·13			038	·40	·045	..	..
	155	6	0	0	0	104	·00	4·72	1·26	4·65	8·42	166·3	W	5	5,564	3·57	5	8·46	W	5	4·21	·856	·767	8·44	W	5	217	4·28	·835	·893	·864
			0	0	0	240	·00	·40	·14	·30	·24	·0			1,141	·63					·82	·075	..	·18			049	·52	·072	..	..
	156	1	0	0	0	22	?·00	3·91	2·06	3·98	8·25	165·2	E	4	4,930	3·26	1	8·25	Calm.		3·94	·827	·750	8·25	Calm.		223	4·29	·760	·889	·861
	157	4	0	4&5	0	34	·00	4·63	1·25	4·30	8·02	164·0	SE *b* S	1	4,810	3·31	4	8·02	SE	1	4·02	·825	·760	8·01	SE	2	212	4·12	·804	·885	·858
			0	2	0	113	·00	·06	·05	·19	·16	·0			476	·26					·21	·061	..	·16			028	·28	·082	..	..
	158	2	0	0	0	196	?·00	4·81	1·25	4·23	7·84	164·0	W	3	4,861	3·43	2	7·79	Calm.		4·25	·806	·768	7·79	Calm.		215	4·10	·837	·881	·853
			0	0	0	3	?·00	·15	·15	·25	·08	·0			65	·01					·10	·016	..	·03			000	·01	·005	..	..

Digitized by Google

SOLAR EMBANKMENT MAIN SITE.

| | | |

ABSTRACT TABLE 22.

CENTRAL SURFACE AND MEAN VELOCITIES—ABSTRACT OF RESULTS.

This Table is an Abstract from the Detailed Comparison Tables LXV. to LXIX. with the addition of Bazin's and Kutter's Co-efficients.

Two lines are in general devoted to each Series. The upper line shows the "Mean Results" throughout; in Series of more than one set the second line (old brevier type, as 108) shows the "Ranges."

[Lengths of Sub-Reaches as follows (in miles):—Fifteenth Mile Sites, 2, 3, 4½; Beira, 1, 4; Jaoli, ¾, 5; Kambera, 2½, 8¾]

1			2								3						4						5						
			CONTROL.					SURFACE-FALL.			ROD-VELOCITY RESULTS.						CENTRAL SURFACE-VELOCITY RESULTS						SURFACE-SLOPE RESULTS.						
			Head of Reach.		Tail of Reach.																								
SITES.	Serial No.	Number of Sets (Cols. 3, 5).	Gates open in Dam.	Openes open in Dam.	Gates closed in Regulator.	Withdrawn by Distributaries.	Average Obstruction.	Upper Sub-Reach.	Middle Sub-Reach.	Lower Sub-Reach.	Hyd. Mean Depth.	Surface-Breadth.	Average Wind. Direction.	Average Wind. Velocity.	Cubic Discharge in cub. feet per sec.	Mean Velocity.	Number of Sets.	Hyd. Mean Depth.	Average Wind. Direction.	Average Wind. Velocity.	Central Surface Velocity.	Ratio $V \div v_o$. Experl.	Ratio $V \div v_o$. Bazin's Rule.	Hyd. Mean Depth.	Average Wind. Direction.	Average Wind. Velocity.	Surface-Slope. [L. or R. Bank]	Value of $100\sqrt{RS}$	Ratio $V \div w$. Experl.	Ratio $V \div w$. Bazin's.	Ratio $V \div w$. Kutter's
			Q	k	F_1	F_2	F_3	R	b		D	V	B			v_o	c	C_b	R			s	w	C	C_b	C_k
FIFTEENTH MILE. Old Site.	191	1	0	0	0	123	·00	2·28	3·63	5·54	9·49	174·9	NE	2	7,187	4·16	1	9·48	NW	1	4·91	·847	·775	9·51	NW	1	240 L	4·77	·872	·910	·878
	192	6	0	0	0	44	·00	2·26	3·65	4·87	8·64	174·9	N	1	6,199	3·98	6	8·64	N	1	4·60	·866	·779	8·65	N	1	231 Bank	4·47	·898	·896	·867
			0	0	0	115	·00	·05	·08	·10	·06	·0			602	·39		·06			·17	·088	..	·06			033	·32	·107	..	..
	193	3	0	0	0	80	·00	2·30	3·60	4·73	8·35	174·9	NNW	2	5,786	3·87	3	8·36	S	2	4·51	·857	·778	8·34	N	3	227 Left	4·36	·887	·891	·862
			0	0	0	126	·00	·08	·08	·05	·07	·0			114	·04		·08			·13	·19	..	·03			007	·05	·012	..	..
	194	2	0	0	0	0	·00	2·27	3·66	4·40	8·02	174·9	SW	1	5,622	3·93	2	8·01	Calm.		4·61	·871	·783	8·02	SW	2	231 Left	4·31	·912	·885	·857
			0	0	0	0	·00	·01	·06	·30	·21	·0			179	·01		·22			·11	·014	..	·23			005	·01	·000	..	..
	195	1	0	0	0	62	·00	2·06	3·79	3·65	7·13	171·3	N	1	4,370	3·51	1	7·15	Calm.		4·21	·834	?	No Observations.					..	..	
New Site.	196	3	0	0	0	268	·00	2·26	3·65	5·37	8·67	185·9	W	1	6,857	4·12	3	8·67	SW	1	4·69	·880	·788	8·68	W	1	?221 Both	?4·38	?·942	·897	·953
			0	0	0	0	·00	·07	·07	·22	·08	·3			115	·03		·04			·16	·028	..	·09			?011	?·10	?·028	..	..
	197	1	0	0	?	115	·00	2·19	3·66	5·20	8·35	184·2	SW	7	6,287	3·98	1	8·37	SW	7	4·52	·881	·786	8·35	SW	7	220 Both	4·29	·928	·891	·948
RA.	201	5	Head.		Head.	169	·00	?·70	Reach.	?3·98	9·02	188·4	S	1	5,611	3·17	4	9·02	S	1	3·67	·859	·751	9·02	S	1	191	4·15	·763	·902	·747
						230	·00	?·05		?·15	·26	·2			393	·27		·24			·14	·053	..	·26			025	·28	·047	..	..
	202	7				188	·00	?·82		?3·70	8·72	188·0	NNW	2	5,329	3·12	7	8·73	NW	3	3·70	·846	·747	8·72	N ¾ W	3	200 Both	4·17	·749	·898	·741
						298	·00	?·32		?·22	·23	·3			282	·19		·20			·26	·040	..	·23			030	·27	·032	..	..

Digitized by Google

| | | |

ABSTRACT TABLE 23.

CUBIC DISCHARGE TABLE.

This Table shows the Cubic Discharge in the Roorkee, Belra, and Kamhera Reaches (for each half-foot of the Standard Gauge* of the Reach) and also in the four Distributaries (a few cases only);—1°, according to the Results of these Experiments, and 2°, to the official Canal Tables in use at the time.

* The "Standard Gauges" are those used for the Canal Tables; their positions are shown in Plates I, III, IV.

ROORKEE REACH.			BELRA REACH.			KAMHERA REACH.			DISTRIBUTARIES.			
Solání Aqueduct Gauge.	Solání Embankment, Main Site. [Present Experiments].	Solání Aqueduct Site. [Canal Tables]	Belra Gauge.	Belra Site. [Present Experiments].	Belra Site. [Canal Tables].	Kamhera Bridge Gauge.	Kamhera Discharge Site. [Present Experiments].	Kamhera Bridge Site. [Canal Tables].	Name.	Gauge-Reading.	Experimental Site, see Plate III. [Present Experiments].	Sites near Gauges. [Canal Tables].
·5	?	119	·5		221	·5		..				
1·0	123	238	1·0		443	1·0		..	Right Jaoli.	3·1	98	105
1·5	?	440	1·5		665	1·5		Nil.		4·3	191	166
2·0	625— 260	642	2·0		887	2·0		12				
2·5	850— 327	926	2·5		1,297	2·5		43	Mansúrpur.	3·6	73	60
3·0	1,180— 420	1,211	3·0		1,707	3·0		91		3·9	83	69
3·5	865— 490	1,495	3·5		2,117	3·5		155		4·1	91	75
4·0	1,520—1,080	1,780	4·0		2,525	4·0		231				
4·5	2,060— 480	2,105	4·5		2,787	4·5		318				
5·0	2,340	2,430	5·0		3,050	5·0		416	Miránpur.	2·8	25	22
5·5	3,190	2,755	5·5		3,350	5·5		525		3·8	41	44
6·0	3,584	3,105	6·0	4,410	3,700	6·0	690	643				
6·5	4,020	3,455	6·5	4,810	4,143	6·5	770	769				
7·0	4,170	3,805	7·0	5,325	4,590	7·0	860	903	Pimora.	3·3	50	48
7·5	4,880—4,460	4,155	7·5	5,655	5,033	7·5	970	1,044		3·8	63	57
8·0	4,830	4,530	8·0	?	5,478	..	..	..				
8·5	5,470	4,905	..	..	..	..	..	..	..	..	..	..
9·0	6,010	5,305	..	..	..	..	..	..	..	..	..	..
9·5	6,300	5,705	..	..	..	..	..	..	..	..	..	..
10·0	7,270—6,770	6,105	..	..	..	..	..	..	..	..	..	..

No Experiments

Digitized by Google

ABSTRACT TABLE 24.

CUBIC DISCHARGE-VERIFICATION.

Range of Mean Velocities in each Series.

This Table shows the highest Mean Velocity, and corresponding Gauge-Reading in every Series, and also the (actual and percentum) Range of Mean Velocity, and Range of Gauge-Reading corresponding.

SITES.	Serial No.	Number of Sets.	Depth. Gauge of max. V.	Depth. Range [max. to min. V].	Mean Velocity. Maximum. V	Mean Velocity. Range. Actual.	Mean Velocity. Range. Per cent. (of max.)
SOLANI LEFT AQUEDUCT.	101	3	9·83	·17	4·12	·09	2·2
	102	12	9·50	·00	3·73	·26	7·0
	103	4	9·40	·03	3·91	·09	2·3
	104	12	9·15	·25	3·69	·16	4·3
	105	2	8·67	·13	3·78	·16	4·2
	106	6	8·19	·22	3·54	·20	5·7
	107	6	7·53	·05	3·48	·13	3·7
SOLANI RIGHT AQUEDUCT. (Left Aqueduct open).	108	19	9·98	·01	4·30	·45	10·5
	109	18	9·68	·03	4·35	·61	14·0
	110	20	9·39	·14	4·24	·63	14·9
	111	16	8·98	·05	4·06	·37	9·1
	112	18	8·67	·12	3·92	·29	7·4
	113	1	..	..	..	..	..
	114	20	7·95	·00	3·76	·29	7·7
	115	1	..	..	..	..	..
	116	7	7·55	·01	3·66	·17	4·6
	117	2	7·08	·02	3·73	·13	3·5
	118	16	6·86	·18	3·70	·17	4·6
	119	7	6·13	·17	4·04	·48	11·9
	120	9	5·75	·11	3·46	·34	9·8
	121	2	5·58	·05	3·46	·06	1·7
	122	13	4·35	·14	3·35	·66	19·7
	123	1	..	..	..	..	..
	124	1	..	..	..	..	..
	125	1	..	..	..	..	..
	126	1	..	..	..	..	..
	127	1	..	..	..	..	..
[L. Aqueduct closed].	131	2	4·60	·00	1·26	·05	4·0
	132	2	3·98	·05	4·87	·09	1·9
	133	1	..	..	..	..	..
	134	1	..	..	..	..	..
	135	1	..	..	..	..	..
	136	1	..	..	..	..	..
	137	1	..	..	..	..	..
	138	1	..	..	..	..	..
	139	2	2·71	·11	2·28	·17	7·5
SOLANI EMBANKMENT MAIN SITE.							
High Water.							
	151	5	9·95	·07	4·11	·20	4·9
	152	17	9·98	·16	3·93	·26	6·6
	153	6	9·71	·28	3·84	·20	5·2
	154	5	9·08	·07	3·81	·18	4·7
	155	6	8·82	·29	4·05	·63	15·6
	156	4	8·44	·02	3·32	·17	5·1
	157	7	8·24	·16	3·44	·26	7·6
	158	2	7·95	·10	3·43	·01	·3
	159	9	7·68	·22	3·40	·35	10·3
	160	6	6·97	·10	3·28	·10	3·1
	161	11	6·84	·01	3·18	·11	3·5
	162	5	6·26	·23	3·52	·37	10·5
	163	6	5·66	·15	3·15	·20	6·4
	164	1	..	..	..	..	..
	165	6	5·01	·15	2·87	·49	17·1
	166	3	4·46	·20	2·40	·07	2·9
Low Water.							
	167	10	3·98	·10	2·20	·14	6·4
	168	1	..	..	..	..	..
	169	10	3·75	·03	2·13	·35	16·4
	170	2	3·63	·01	1·54	·08	5·2
	171	3	3·67	·06	·93	·12	12·9
	172	2	3·64	·13	·69	·07	10·1
	173	5	3·49	·02	1·40	·09	6·4
	174	1	..	..	..	..	..
	175	5	2·87	·04	1·82	·07	3·9
	176	2	2·83	·01	1·65	·00	·0
	177	4	2·47	·14	1·58	·16	10·1
	178	2	2·30	·25	·86	·10	11·7
	179	4	2·00	·15	1·34	·13	9·7
	180	2	1·69	·05	·90	·06	6·7
	181	1	..	..	..	..	..
FIFTEENTH MILE.	191	1	..	..	..	..	..
	192	6	14·34	·01	4·16	·39	9·4
	193	3	14·03	·08	3·89	·04	1·0
	194	2	13·48	·24	3·93	·01	·3
	195	1	..	..	..	..	..
	196	3	15·20	·03	4·14	·03	·7
	197	1	..	..	..	..	..
BELRA.	201	5	7·44	·10	3·27	·27	8·3
	202	7	7·04	·06	3·22	·19	5·9
	203	9	6·79	·01	3·20	·29	9·1
	204	14	6·44	·01	3·14	·20	6·4
	205	6	6·32	·05	3·09	·04	1·3
	206	12	5·82	·04	3·06	·27	8·8
JAOLI.	211	9	7·28	·21	3·06	·19	6·2
	212	6	6·68	·08	3·05	·23	7·5
	213	7	6·35	·04	2·98	·21	7·1
	214	8	6·26	·06	2·89	·15	5·2
	215	10	5·96	·11	2·95	·27	9·2
	216	9	5·74	·09	2·84	·27	9·5
	217	6	5·41	·01	2·64	·04	1·5
KAMHERA.	221	4	6·34	·10	2·88	·05	1·7
	222	15	6·02	·19	2·94	·22	7·5
	223	11	5·93	·04	2·95	·26	8·8
	224	12	5·61	·07	2·84	·21	7·4
	225	14	5·39	·11	2·80	·16	5·7
DISTRIBUTARIES.	231	2	4·34	·01	2·52	·01	·4
	232	2	3·10	·01	2·10	·00	·0
	233	4	4·05	·20	2·14	·11	5·1
	234	1	..	..	..	..	..
	235	1	..	..	..	..	..
	236	2	2·83	·00	1·49	·00	·0
	237	2	3·78	·01	1·84	·02	1·1
	238	2	3·37	·09	1·79	·08	4·5

Digitized by Google

CUBIC DISCHARGE-VERIFICATION.

ABSTRACT TABLE 25.

Cases of High Mean Velocity Range (over 10 per cent.) in a Series.

The cases of high mean velocity are shown to left; followed by all cases of mean velocity = or < $\frac{9}{10}$ of the high values (in same Series). The External Conditions affecting them follow.

Sites.	Serial No.	Date or Number of Set.	Mean Velocity. High V.	Mean Velocity. % of high V [computed]	Mean Velocity. Number of cases V = or < ·9 × high V.	Mean Velocity. Low V. V = or < $\frac{9}{10}$ of high V	Depth. Gauge-Reading. H or h	Depth. Variation.	Length of Rod. l	Surface-Fall. Upper Sub-Reach. F_1	Surface-Fall. Middle Sub-Reach. F_2	Surface-Fall. Lower Sub-Reach. F_3	Surface-Slope. S	Wind. From Direction.	Wind. From Velocity.	Wind. To Direction.	Wind. To Velocity.	Probable Causes of high velocity.	Probable Causes of uncertain results.
RIGHT AQUEDUCT.	108	14-12-'78	4·30	3·87	2	..	9·98	·00	9	5·97	No Middle Sub-Reach.	5·55	175	S	9	?	?	Short Rod, high F_1.	
		1-6-'77	..	..	..	3·87	10·00	·00	9½	5·90		5·70	?	SE	8	E	11	.. ..	High wind.
		8-6- „	..	..	..	3·85	9·97	+·01	9⅓	5·73		5·62	?	W	4	S	7	.. ..	
	109	29-7-'78	4·35	3·91	11	..	9·68	+·05	9	6·07		5·23	198	..	0	S & W	8	High F_1.	
		Nos. 2 to 4, & 10 to 17	Max. data of 11,			3·89	·65	·12	9	5·94		5·43	?195	NE	12	N	18	.. ..	
			Min. data of 11,			3·74	·50	·00	9	5·73		4·95	?185	..	0	..	0	.. ..	
	109	14-11-'77	4·28	3·85	4	..	9·64	+·02	9	6·16		5·14	?	S	4	S	5	High F_1.	
		Nos. 3, 4, 14, 17	Max. data of 4,			3·84	·65	·00	9	5·85		5·40	195	NE	12	NE	17	.. ..	
		„ „ „	Min. data of 4,			3·74	·50	·00	9	5·80		4·95	190	..	0	..	0	.. ..	
	109	14-11-'77	4·17	3·75	1	..	9·66	+·02	9	6·14		5·16	?	S	5	SSW	13	High F_1, ...	High wind.
		8-5- „	..	..	..	3·74	·65	·00	9	5·80		4·95	190	NE	12	N	10	.. ..	High wind.
	110	8-8-'78	4·24	3·82	13	..	9·39	−·03	8½	6·21		4·94	203	..	0	..	0	Short Rod, high F_1.	
		Nos. 1, 3, 4, 6, 11 & 13 to 20	Max. data of 13,			3·82	·42	·05	9	6·11		5·27	?200	NE	10	N	13	.. ..	
			Min. data of 13,			3·61	·25	·00	8⅝	5·75		5·10	?183	..	0	..	0	.. ..	
	110	28-5-'78	4·02	3·62	1	..	9·42	·00	9	5·98		5·12	188	NW	1	V	1	High F_1.	
		26-4-'77	..	..	..	3·61	·25	·00	9	5·75		5·10	183	..	0	N	13	.. ..	High wind.

Digitized by Google

119	9-7-'78	4·04	3·64	2	..	6·18	+·25	5½	6·97	No Middle Sub-Reach.	2·93	313	..	0	..	0	Short Rod, high F_1, S.	Canal not in train.
	10-7- „	..	..	..	3·62	·11	+·15	5½	6·79		2·41	273	N	6	V	15	.. ..	Water rose ·15.
	25-7-'76	..	..	..	3·56	·30	·00	6	6·40		3·10	240	..	0	..	0	.. ..	
122	23-8-'78	3·35	3·02	10	..	4·35	+·05	3½	6·05		1·95	260	..	0	N	5	Short Rod, high F_1, F_2, S ?	
	22-7-'76	3·30	2·97	10	..	·33	·00	4	6·67		1·73	330	S	6	SE	4	High F_1, (and S ?).	
	23-8-'78	3·24	2·92	10	..	·43	+·05	4	6·37		2·23	242	N	7	E	8	High F_1, (and S ?).	
	Nos. 1 to 10	Max. data of 10,			2·88	·57	·05	4	5·68		1·79	?218	S	9	S	19	.. ..	
	„ „ „	Min. data of 10,			2·69	·40	·00	4	5·61		1·70	?195	..	0	..	0	.. ..	

155	28-10-'78	4·05	3·65	5	..	8·82	·00	Longest possible in each Float-Course.	5·01	1·34	4·45	248	..	0	..	0	High F_1, F_2, S. ..	Change of soundings?
	Nos. 1 & 3 to 6	Max. data of 5,			3·58	·82	·21		4·70	1·29	4·75	217	W	20	W	19	.. ..	
	„ „ „	Min. data of 5,			3·42	·53	·00		4·61	1·20	4·48	199	V	1	..	0	.. ..	
159	9-9-'76	3·40	3·06	1	..	7·68	−·04		4·85	1·35	3·95	215	..	0	S	14	High F_1 & F_2. ..	High wind.
	27-2-'77	..	..	..	3·05	·46	·00		4·57	1·23	3·90	?	S *b* W	7	W *b* S	25	.. ..	High wind.
162	24-10-'76	3·52	3·17	1	..	6·26	−·02		5·27	1·10	3·13	160	ENE	7	NE	4	High F_1, (& F_2 ?).	
	2-2-'78	..	..	..	3·15	·49	−·01		4·94	1·26	2·95	217	S	9	S	9	.. ..	
165	10-10-'77	2·87	2·58	3	..	5·01	−·05		4·42	1·26	2·32	?	E *b* S	5	SW	7	High F_2 & F_3. ..	
	Nos. 4 to 6	Max. data of 3,			2·46	·00	·03		4·63	0·97	1·30	170	..	0	E	14	.. ..	
	„ „ „	Min. data of 3,			2·38	4·86	·00		4·67	0·73	1·20	155	..	0	..	0	.. ..	
169	8-2-'77	2·13	1·92	9	..	3·75	·00		4·78	1·17	1·75	?	NE	8	S	15	High F_1 & F_2. ..	Canal not in train in Sets 4 to 10, see Table XLVI.
	Nos. 1, 2, 4 to 10	Max. data of 9,			1·91	·79	·03		4·73	1·49	1·00	?200	NE	10	SW	19	.. ..	
	„ „ „	Min. data of 9,			1·78	·70	·00		4·39	0·89	·40	?200	..	0	..	0	.. ..	
171	31-10-'77	·93	·84	2	..	3·67	+·01		3·66	·24	·10	038	S	4	S	17	High F_2.	High wind.
	30-10- „	..	..	..	·84	·57	·00		3·66	·24	·00	?	E	10	S	9	.. ..	High wind.
	„ „	..	..	..	·81	·61	+·08		3·62	·24	·04	?	S	9	SW	18	.. ..	High wind.
172	26-10-'77	·69	·62	1	..	3·64	·00		3·39	·26	·05	?	SE	10	..	0	High F_2.	
	22-10- „	..	..	..	·62	·51	−·05		3·42	·13	·05	?	NW	4	SW *b* W	10	.. ..	
177	30-9-'76	1·58	1·42	1	..	2·47	+·04		5·06	1·14	1·10	?	NE	4	E	17	High F_2.	High wind.
	28-9- „	..	..	..	1·42	·33	−·03		5·05	1·00	1·13	185	E	12	E	27	.. ..	High wind.
178	16-10-'77	·86	·77	1	..	2·30	·00		4·63	·27	·10	?	..	0	SE	8	High F_1.	
	„ „	..	..	..	·76	·55	+·10		4·08	·37	·25	?	S *b* W	7	..	0	.. ..	Canal not in train.

Digitized by Google

RANGE OF MEAN VELOCITY MEASUREMENTS OF SAME DAY, AT SAME SITE.

[The + and − signs in Range Column indicate that the Mean Velocity increases or decreases with increase of depth.]

SITE.	Serial No.	Date.	Gauge-Reading. H	Mean Velocity. V	RANGE of Mean Vely. Actual.	RANGE of Mean Vely. Per cent. [of max.]
SOLANI LEFT AQUEDUCT.	102	2-4-'75	9·75	3·49	·02	·6
		" "	·75	3·47		
		31-3- "	9·70	3·64	·10	2·8
		" "	·70	3·54		
		1-4- "	9·70	3·49	·04	1·1
		" "	·70	3·53		
		30-3- "	9·65	3·60	·03	·8
		" "	·65	3·63		
		29-3- "	9·50	3·71	·02	·5
		" "	·50	3·73		
		3-4- "	9·50	3·47	·05	1·4
		" "	·50	3·52		
		23-3- "	9·15	3·55	·14	3·8
		" "	·15	3·69		
		24-3- "	9·15	3·61	·00	·00
		" "	·15	3·61		
	104	22-3- "	9·10	3·63	·05	1·4
		" "	·10	3·68		
		25-3- "	9·10	3·67	·07	1·9
		" "	·10	3·60		
		20-3- "	8·90	3·60	·02	·6
		" "	·90	3·61		
		" "	·90	3·59		
SOLANI EIGHT AQUEDUCT.	111	14-7-'76	8·90	4·02	·05	1·2
		" "	·90	3·97		
		16-4-'77	8·64	3·66	·00	·0
		" "	·64	3·66		
		17-4- "	8·60	3·69		
		" "	·60	3·72	·07	1·9
		" "	·59	3·66		
		" "	·59	3·73		
	112	11-4- "	8·58	3·76		
		" "	·57	3·66	+·11	2·9
		" "	·56	3·75		
		" "	·55	3·65		
		18-7-'76	8·50	3·75	·12	3·1
		" "	·50	3·82		
		1-4- "	8·05	3·51	·00	·0
		" "	·05	3·51		
		4-4- "	8·00	3·60		
		" "	·00	3·63	·08	2·2
		" "	·00	3·55		
	114	6-4- "	7·98	3·51		
		" "	·98	3·50	−·13	3·6
		" "	·95	3·63		
		5-4- "	7·95	3·58		
		" "	·95	3·58	·07	1·9
		" "	·95	3·57		
		" "	·95	3·64		
R. AQUEDUCT, (L. Aq. closed).	131	27-10-'77	4·60	1·21	·05	4·0
		" "	·60	1·26		
	132	1-9-'76	3·98	4·57	+·09	1·9
		" "	·93	4·78		
	139	20-9-'78	2·71	2·28	+·17	7·5
		" "	·60	2·11		
	135	21-9- "	3·18	3·20	+·41	12·8
	136	" "	·12	2·79		
	134	31-8-'76	3·58	3·22		
	137	" "	·13	2·51	+·71	22·0
	138	" "	2·88	2·54		
SOLANI EMBANKMENT MAIN SITE.	151	19-12-'78	9·93	3·93	−·11	2·7
		" "	·91	4·04		
		22-12-'76	9·98	3·93	·05	1·3
		" "	·98	3·88		
	152	28-12- "	9·89	3·88		
		" "	·91	3·80	−·08	2·1
		26-12- "	9·85	3·74	·12	3·1
		" "	·85	3·86		
		29-1-'77	8·44	3·32	−·06	1·8
		" "	·47	3·26		
	156	30-1- "	8·41	3·23	−·08	2·5
		" "	·42	3·15		
	160	22-2-'78	7·07	3·19		
		" "	·07	3·18	+·04	1·2
		" "	·10	3·22		
SOLANI EMBANKMENT MAIN SITE.	169	17-2-'77	3·79	1·87	+·09	4·8
		" "	·78	1·78		
		6-10-'76	3·76	1·91		
		" "	·75	1·89	+·06	3·1
		" "	·73	1·85		
		" "	·72	1·87		
		5-10- "	3·72	1·86		
		" "	·71	1·85	+·01	·5
		" "	·70	1·85		
	171	30-10-'77	3·61	·81	−·03	3·6
		" "	·57	·84		
		4-10-'76	2·87	1·82		
		" "	·90	1·78		
	175	" "	·92	1·80	−·07	3·9
		" "	·91	1·75		
		" "	·90	1·78		
	178	16-10-'77	2·30	·86	−·10	11·6
		" "	·55	·76		
	179	2-10-'76	2·00	1·34	+·03	2·2
		" "	1·99	1·31		
		3-10- "	1·85	1·21	−·01	·8
		" "	·84	1·22		
BELRA.	202	23-1-'79	6·98	3·19	+·06	1·9
		" "	·94	3·13		
	203	25-2- "	6·79	3·06	+·05	1·6
		" "	·75	3·01		
	204	27-2- "	6·51	2·96	−·03	1·0
		" "	·49	2·99		

Digitized by Google

| SOLANI RIGHT AQUEDUCT. | | |

RANGE OF MEAN VELOCITY MEASUREMENTS OF SAME DAY, AT SAME SITE.

[The + and − signs in Range Column indicate that the Mean Velocity increases or decreases with increase of depth.]

SITE.	Serial No.	Date.	Gauge-Reading. H	Mean Velocity. V	RANGE of Mean Vely. Actual.	RANGE of Mean Vely. Per cent. [of max.]
SOLANI LEFT AQUEDUCT.	102	2-4-'75	9·75	3·49	·02	·6
		" "	·75	3·47		
		31-3- "	9·70	3·64	·10	2·8
		" "	·70	3·54		
		1-4- "	9·70	3·49	·04	1·1
		" "	·70	3·53		
		30-3- "	9·65	3·60	·03	·8
		" "	·65	3·63		
		29-3- "	9·50	3·71	·02	·5
		" "	·50	3·73		
		3-4- "	9·50	3·47	·05	1·4
		" "	·50	3·52		
		23-3- "	9·15	3·55	·14	3·8
		" "	·15	3·69		
		24-3- "	9·15	3·61	·00	·00
		" "	·15	3·61		
	104	22-3- "	9·10	3·63	·05	1·4
		" "	·10	3·68		
		25-3- "	9·10	3·67	·07	1·9
		" "	·10	3·60		
		20-3- "	8·90	3·65	·02	·6
		" "	·90	3·61		
		" "	·90	3·59		
SOLANI RIGHT AQUEDUCT.	111	14-7-'76	8·90	4·02	·05	1·2
		" "	·90	3·97		
		16-4-'77	8·64	3·66	·00	·0
		" "	·64	3·66		
		17-4- "	8·60	3·69		
		" "	·60	3·72	·07	1·9
		" "	·59	3·66		
	112	" "	·59	3·73		
		11-4- "	8·58	3·76		
		" "	·57	3·66	+·11	2·9
		" "	·56	3·75		
		" "	·55	3·65		
		13-7-'76	8·50	3·75	·12	3·1
		" "	·50	3·82		
		1-4- "	8·05	3·51	·00	·0
		" "	·05	3·51		
		4-4- "	8·00	3·60		
		" "	·00	3·63	·08	2·2
		" "	·00	3·55		
	114	6-4- "	7·98	3·51		
		" "	·98	3·50	−·13	3·6
		" "	·95	3·63		
		" "				
		5-4- "	7·95	3·58		
		" "	·95	3·58	·07	1·9
		" "	·95	3·57		
		" "	·95	3·64		
R. AQUEDUCT, (L. Aq. closed).	131	27-10-'77	4·60	1·21	·05	4·0
		" "	·60	1·26		
	132	1-9-'76	3·98	4·57	+·09	1·9
		" "	·93	4·78		
	139	20-9-'78	2·71	2·28	+·17	7·5
		" "	·60	2·11		
	135	21-9- "	3·18	3·20	+·41	12·8
	136	" "	·12	2·79		
	134	31-8-'76	3·58	3·22		
	137	" "	·13	2·51	+·71	22·0
	138	" "	2·88	2·54		
SOLANI EMBANKMENT MAIN SITE.	151	19-12-'78	9·93	3·93	−·11	2·7
		" "	·91	4·04		
		22-12-'76	9·98	3·93		
		" "	·98	3·88	·05	1·3
	152	28-12- "	9·89	3·88		
		" "	·91	3·80	−·08	2·1
		26-12- "	9·85	3·74		
		" "	·85	3·86	·12	3·1
		29-1-'77	8·44	3·32		
		" "	·47	3·26	−·06	1·8
	156	30-1- "	8·41	3·23		
		" "	·42	3·15	−·08	2·5
		22-2-'78	7·07	3·19		
	160	" "	·07	3·18	+·04	1·2
		" "	·10	3·22		
SOLANI EMBANKMENT MAIN SITE.	169	17-2-'77	3·79	1·87	+·09	4·8
		" "	·78	1·78		
		6-10-'76	3·76	1·91		
		" "	·75	1·89	+·06	3·1
		" "	·73	1·85		
		" "	·72	1·87		
		5-10- "	3·72	1·86		
		" "	·71	1·85	+·01	·5
		" "	·70	1·85		
	171	30-10-'77	3·61	·81	−·03	3·6
		" "	·57	·84		
		4-10-'76	2·87	1·82		
		" "	·90	1·78		
	175	" "	·92	1·80	−·07	3·9
		" "	·91	1·75		
		" "	·90	1·78		
	178	16-10-'77	2·30	·86	−·10	11·6
		" "	·55	·76		
		2-10-'76	2·00	1·34		
	179	" "	1·99	1·31	+·03	2·2
		3-10- "	1·85	1·21		
		" "	·84	1·22	−·01	·8
BELKA.	202	23-1-'79	6·98	3·19		
		" "	·94	3·13	+·06	1·9
	203	25-2- "	6·79	3·06		
		" "	·75	3·01	+·05	1·6
	204	27-2- "	6·51	2·96		
		" "	·49	2·99	−·03	1·0

Digitized by Google

| SOLANI RIGHT AQUEDUCT. | | |

CUBIC DISCHARGE-VERIFICATION. **ABSTRACT TABLE 27.**

DISCHARGE-MEASUREMENTS AT SAME SITE ON SAME DAY.

Details of Cases of very high (over 10 %), high (over 5 %), and moderate (over 3 %), Discrepancy.

[The + and − signs in the Discrepancy Column indicate that the Mean Velocity increases or decreases with the depth].

DISCREPANCY.	SITES.	Serial No.	1	2							3				4				5	PROBABLE CAUSES	
				MEAN VELOCITY.				DEPTH.			SURFACE-FALL.				WIND.						
						Discrepancy		Gauge.							From		To				
			Date, 1875-79.	High V.	Low V.	Actual.	Per cent. [of max.]	Hor^l	Variation.	Length of Rod. l	Upper. F1	Middle. F2	Lower. F3	Slope. S	Direction.	Velocity.	Direction.	Velocity.	Timekeeper.	of high velocity.	of uncertain results.
High and very high (over 5, & 10 %).	SOLANI RIGHT AQUEDUCT. Left Aqueduct closed. Left open	126	11-7-'78	1·24	..			1·92	−·24	1½	5·93	No Middle Sub-Reach.	?−·38	?	S 6		S 5		R	.. .. ?	Water fell 1·36.
		127	„ „	..	·60	+·64	51·6	0·70	·00	2½	7·40		?·00	113	S 11		S 8		P	.. ..	
		136	21-9-'78	..	2·79			3·12	+·03	2½	6·28		·62	208	.. 0		.. 0		R	.. ..	Water rose ·10.
		135	„ „	3·20	..	+·41	12·8	3·18	+·05	2½	6·22		·68	253	.. 0		.. 0		P	High F_3, and S...	
		138	31-8-'76	..	2·54	+·68	21·1	2·88	+·05	2	6·52		·18	145	.. 0		.. 0		W	.. ..	Water rose ·76.
		137	„ „	..	2·51	+·71	22·0	3·13	+·10	3	6·47		·43	200	.. 0		SW 12		H	.. ..	
		134	„ „	3·22	..	..	..	3·58	+·06	3	6·22		·88	?	SSW 10		SW 9		W	High F_3.	
		139	20-9-'78	2·28	..	+·17	7·5	2·71	−·02	2	5·89		·21	168	NW *l*		V *l*		R	High F_3, and S...	Water fell ·12.
			„ „	..	2·11			2·60	·00	2	6·00		·10	133	V *l*		S 5		P	.. ..	
	SOLANI EMBANKMENT.	166	11-10-'77	..	2·33	+·40	14·7	4·26	·00	Longest possible.	4·77	1·23	2·00	?	E 4		E 15		G	.. ..	Water rose 1·35.
		164	„ „	2·73	..	..	..	5·24	+·75		5·29	1·72	2·49	?	W 7		N 4		P	High F_1, F_2, and F_3	
			10-10-'76	2·62	..	−·16	6·1	4·97	+·02		4·91	·94	1·80	180	.. 0		NW 6		W	High F_1.	Water rose ·05.
		165	„ „	2·60	..	·14	5·4	5·00	+·03		4·88	·97	„	170	NW 6		.. 0		P	High F_1.	
			„ „	..	2·46	..	..	5·00	·00		4·63	„	„	170	.. 0		W 5		W	.. ..	
		165	10-10-'77	2·87	..	..	..	5·01	−·05		4·42	1·26	2·32	?	E *b* S 5		SW 7		G	High F_3	Water fell ·54.
		166	„ „	..	2·39	+·48	16·7	4·53	−·07		4·70	1·20	1·90	?	WSW 9		WSW 6		G	.. ..	
		168	15-10-'77	1·69	..	..	..	3·98	−·23		4·45	·65	·60	?	ENE 9		E 17		G	High F_1, F_2, and F_3	Water fell ·48.
		170	„ „	..	1·46	+·23	13·6	3·64	−·06		3·79	·56	·35	?	SE *b* S 5		V *l*		G	.. ..	
		178	16-10-'77	·86	..			2·30	·00		4·63	·27	·10	?	.. 0		SE 8		G	High F_1.	Water rose ·30.
			„ „	..	·76	−·10	11·6	2·55	+·10		4·08	·37	·25	?	S *b* W 7		.. 0		P	.. ..	

Digitized by Google

Cases of moderate (over 8 per cent) Divergency.

	Left.																								
SOLANI AQUEDUCTS.	104	23-8-'75	..	3·55	·14	3·8	9·15	·00	8½	5·65	5·15	?	..	0	?	?0	E	..	..	..	..		
		„ „	3·69	..			9·15	·00	8½	„	„	?	..	?0	..	0	W	..	..	?	..		
	Right (Left open).									No Middle Sub-Reach.													
	110	2-5-'76	..	3·79	·12	3·1	9·30	·00	9	5·85	5·25	195	..	0	..	0	W	..	..	..	..		
		„ „	3·91	..			9·30	·00	9	„	„		..	0	..	0	H	..	..	?	..		
	112	13-7- „	..	3·75	·12	3·1	8·50	·00	8	5·90	4·60	220	..	0	NNE	8	H	..	..	..	..		
		„ „	3·82	..			8·50	·00	8	„	„		NNE	8	NE	5	W	..	..	?	..		
		6-4- „	3·63	..	..	..	7·95	·00	7	5·85	4·25	?	..	0	..	0	H	..	..	?	..		Water unsteady.
	114	„ „	..	3·51	−·12	3·3	7·98	+·05	7	5·82	4·28	?	..	0	SW	5	W	..	..	..	..		
		„ „	..	3·50	−·13	3·6	7·98	−·05	7	„	„	?	SW	5	SW	9	H	..	..	..	..		
		22-12-'77	..	2·77	·11	3·8	4·57	·00	4	5·63	1·77	?	E	8	V	5	P	..	..	..	..		
	122	„ „	2·88	..			4·67	·00	4	„	„	?	S	9	S	9	P	..	..	?	..		
		23-8-'78	3·35	..	−·11	3·3	4·35	+·05	3½	6·05	1·95	260	..	0	N	5	B	Short Rod, High S.					Water rose ·18.
		„ „	..	3·24			4·43	+·05	4	6·37	2·23	243	N	7	E	8	P	..	..	..	..		
	Right (Left closed).																						
	131	27-10-'77	..	1·21	·05	4·0	4·60	·00	4	3·60	·10	024	..	0	SW	6	G	..	..	..	..		
		„ „	1·26	..			4·60	·00	4	„	„	026	SW	6	NE	5	P	..	..	?	..		
SOLANI IRRIGATION MAIN SITE.										Longest possible.													
	152	26-12-'76	..	3·74	·12	3·1	9·85	+·01		4·78	1·18	5·96	?	4	E	13	P	..	..	..	..		High wind.
		„ „	3·86	..			9·85	·00		„	1·17	5·95	?	9	SE	5	W	..	..	?	..		.. ..
	162	24-10- „	..	3·41	−·11	3·1	6·28	−·01		5·25	1·10	3·15	170	0	ENE	7	P	..	..	..	..		
		„ „	3·52	..			6·26	−·02		5·27	„	3·13	160	7	NE	4	W	..	..	?	..		
	169	17-2-'77	1·87	..	+·09	4·8	3·79	−·03		4·99	·96	·90	?	6	S	6	P	..	..	..	..		.. ..
		„ „	..	1·78			3·78	·00		4·40	·95	·89	?	6	SW	19	W	..	..	?	..		High wind.
		6-10-'76	1·91	..	+·06	3·1	3·76	·00		4·67	·93	1·00	200	0	..	0	P	..	..	..	..		
	169	„ „	..	1·85			3·78	−·01		4·70	·90	„	„	7	NE	5	P	..	..	?	..		
		30-10-'77	·84	..	−·03	3·6	3·57	·00		3·66	·24	·00	?	10	S	9	G	..	..	?	..		High wind.
	171	„ „	..	·81			3·61	+·08		3·62	·24	·04	?	9	SW	18	P	..	..	..	..		Water rose ·08.
		4-10-'76	1·82	..	−·07	3·9	2·87	+·05		5·06	1·14	1·40	215	0	..	0	H	..	..	?	..		
	175	„ „	..	1·75			2·91	−·01		5·02	1·18	„	„	0	..	0	W	..	..	..	..		Water rose ·06.
JAOLI.	215	15-1-'79	..	2·84	+·11	3·7	5·74	+·06		·40	..	4·39	166	N	8	..	0	S	..	..	..	..		
	216	„ „	2·95	..			5·96	+·08		·18	..	4·61	„	S	7	V	7	B	..	..	?	..		Water rose ·29.
KAN-HERA	223	14-1-'79	..	..	+·09	3·1	5·98	−·01		3·00	..	11·49	295	N	13	N	13	Cl	..	..	?	..		
		„ „	2·98	2·86			5·92	·00		2·99	..	11·48	„	NW	10	NW	6	C	..	..	..	..		High wind.
										Longest possible													
DISTRICT-TARIES.	233	18-8-'79	..	2·03	+·07	3·3	3·85	·00		?	?	?	?	..	0	..	0	B	..	..	..	..		
		„ „	2·10	..			3·90	+·06		?	?	?	?	..	0	..	0	C	..	..	?	..		Water rose ·08.
	238	20-8- „	1·79	..	+·08	4·5	3·87	−·02		?	?	?	?	..	0	W	4	B	..	..	?	..		
		„ „	..	1·71			3·28	−·06				?	?	W	7	W	7	C	..	..	..	..		Water fell ·18.

Digitized by Google

DISCHARGE-MEASUREMENTS AT SUCCESSIVE SITES OF SAME REACH, NON-SIMULTANEOUS.

SOLÁNÍ EMBANKMENT MAIN SITE, AND SOLÁNÍ TWIN AQUEDUCT SITES.

COMPARISON NO.	1			2			3		4				5	7			8	9		Probable cause of Discrepancy.
	SITE.	Serial No.	Date, 1877.	DEPTH.			SURFACE-FALL.		WIND.				Timekeeper's Initial.	CUBIC DISCHARGE.			Mean Velocity.	DISCREPANCY in Discharge. Gain + Loss −		
				Above Datum [at Site.]	Variation.	At Solání Aqueduct Gauge.	Upper 5 miles.	Lower 4½ miles.	From		To			At Lower Sites.	Correction for change of depth.	Total.		Actual.	Per cent. of maxi.	
				A or H			$F_1 + F_2$	F_3	Direction.	Velocity.	Direction.	Velocity.		D		D	V			
	Embkt.	157	3-3	8·13	·00	8·05	5·90	4·35	S	4	..	0	W	..	..	4,750	3·26			High F_3.
1	L. Aq.	106	23-2	7·97	·00	7·97	5·98	4·17	S	13	S	17	W	2,399	+24	4,934	3·54	+184	3·7	High ($F_1 + F_2$).
	R. Aq.	114	,,	7·97	·00	·97	,,	,,	S	8	S	13	W	2,486	+25		3·67			High wind.
	Embkt.	157	5-3	8·10	·00	8·00	5·90	4·30	N	4	N	4	P	..	..	4,893	3·37			
2	L. Aq.	106	,,	8·00	·00	·00	,,	,,	S	6	V	*l*	P	2,368	0	4,782	3·48	−111	2·3	? ?
	R. Aq.	114	,,	8·00	·00	·00	,,	,,	V	*l*	S	6	P	2,414	0		3·55			
	Embkt.	157	6-3	8·08	+·01	7·97	5·93	4·27	NW	10	..	0	W	..	..	4,594	3·18			
3	L. Aq.	106	,,	7·98	·00	·98	5·92	4·28	..	0	..	0	W	2,328	−3	4,806	3·43	+212	4·4	? ?
	R. Aq.	114	,,	7·98	·00	·98	,,	,,	N b E	7	..	0	W	2,484	−3		3·66			
	Embkt.	157	7-3	8·07	·00	7·97	5·93	4·27	NW	4	SW	4	P	..	..	4,835	3·35			.. ..
4	L. Aq.	106	23-3	7·97	·00	·97	5·83	4·27	V	*l*	V	*l*	P	2,227	0	4,709	3·34	−126	2·6	Low F_1.
	R. Aq.	114	7-3	7·98	·00	·98	5·92	4·28	V	*l*	S	17	P	2,485	−3		3·66			High wind.
	Embkt.	159	2-3	7·60	·00	7·55	5·85	4·00	W	9	W	14	W	..	..	4,467	3·26			High wind.
5	L. Aq.	107	15-3	7·43	·00	·43	5·87	3·93	S	4	N	7	W	2,151	+35	4,309	3·41	−158	3·5	Low F_3.
	R. Aq.	116	27-3	7·56	+·02	·56	5·84	4·01	N	5	NW	4	W	2,126	−3		3·49			.. ..
	Embkt.	159	27-2	7·46	·00	7·40	5·80	3·90	S b W	7	W b S	25	P	..	..	4,108	3·05			High wind.
6	L. Aq.	107	21-2	7·48	·00	·48	6·02	3·98	V	*g*	V	*g*	P	2,131	−23	4,418	3·35	+310	7·0	High ($F_1 + F_2$).
	R. Aq.	116	,,	7·45	+·06	·45	6·05	3·95	V	*g*	V	*g*	P	2,325	−15		3·57			

Digitized by Google

SIMULTANEOUS DISCHARGE-MEASUREMENTS AT SUCCESSIVE SITES OF SAME REACH.

FIFTEENTH MILE SITE, AND SOLÁNÍ EMBANKMENT MAIN SITE.

COMPARISON NO.	1			2				3				4				5	7	9		Probable cause of Discrepancy.
	SITE.	Serial No.	Date, 1878-79.	DEPTH. Above Datum [at Site.]	Variation.	At Solání Aqueduct Gauge.	Date of Soundings.	SURFACE-FALL. Upper 5 miles.	Lower 4½ miles.	Local Slope Left Bank.	Local Slope Right Bank.	WIND. From Direction.	From Velocity.	To Direction.	To Velocity.	Timekeeper's Initial.	CUBIC DISCHARGE.	DISCREPANCY Gain + Loss − Actual.	Per cent. [of larger.]	
				A				F_1+F_2	F_2	S	S						D			
7	15th M.	196	18-12-'78	15·20	−·03	9·83	16-12-'78	5·97	5·43	215	?	W	3	..	0	R	6,921	+423	5·8	? ?
	Embkt.	151	„ „	9·95	−·01	·88	„ „	5·92	5·48	225	228	S	5	E	7	P	7,344			
8	15th M.	196	19-12- „	15·17	+·01	9·85	16-12- „	5·85	5·45	213	238	..	0	V	*l*	S	6,844	+353	4·9	.. ..
	Embkt.	151	„ „	9·91	+·04	·80	„ „	6·00	5·40	228	225	E	4	E *b* S	8	A	7,197			High ($F_1 + F_2$).
9	15th M.	196	20-12- „	15·10	·00	9·80	16-12- „	5·90	5·23	210	233	..	0	V	*l*	R	6,806	+134	1·9	.. ..
	Embkt.	151	„ „	9·88	−·01	·80	„ „	5·90	5·40	228	238	S	3	W	10	A	6,940			High F_2.
10	15th M.	197	15-4-'79	14·69	+·10	9·35	28-4-'79	5·85	5·20	215	225	V	*l*	SW	14	S	6,287	−102	1·6	High wind.
	Embkt.	153	„ „	9·43	+·15	·38	16-12-'78	5·82	5·23	265	218	W	9	W	25	P	6,185			
11	15th M.	191	29-5-'78	15·31	+·02	9·99	28-3-'78	5·91	5·54	240	.	NW	*l*	NE	3	R	7,187	−597	8·3	? ?
	Embkt.	152	„ „	10·03	−·07	·98	15-8-'76	5·92	5·53	213		W	8	..	0	G	6,590			
12	15th M.	192	10-4- „	14·33	−·01	9·00	28-3-'78	5·90	4·90	253		..	0	..	0	T	6,226	−357	5·7	? ?
	Embkt.	154	„ „	9·11	+·02	·00	15-8-'76	5·90	4·90	215		V	*l*	..	0	G	5,869			
13	15th M.	193	8-4- „	14·03	+·12	8·70	28-3-'78	5·90	4·75	228		..	0	..	0	R	5,851	−391	6·7	? ?
	Embkt.	155	„ „	8·82	+·05	·70	15-8-'76	5·90	4·75	215		V	*l*	W	6	P	5,460			
14	15th M.	193	4-4- „	13·98	·00	8·70	28-3-'78	5·90	4·75	223		..	0	..	0	T	5,771	−154	2·7	? ?
	Embkt.	155	„ „	8·80	+·01	·70	15-8-'76	5·90	4·75	217		W	6	..	0	P	5,617			
15	15th M.	193	29-3- „	13·95	·00	8·70	28-3-'78	5·90	4·70	230		N	8	NW	7	R	5,737	−372	6·5	.. ..
	Embkt.	155	„ „	8·73	−·02	·70	15-8-'76	5·90	4·70	205		W	20	W	19	P	5,365			High wind.
16	15th M.	195	25-5- „	12·53	+·15	7·05	28-3-'78	5·85	3·65	?		..	0	N	*l*	T	4,370	−208	4·8	? ?
	Embkt.	160	„ „	7·20	+·09	·03	15-8-'76	5·85	3·63	218		..	0	V	*l*	G	4,162			

Not observed.

Digitized by Google

CUBIC DISCHARGE-VERIFICATION. ABSTRACT TABLE 30.

Simultaneous Discharge-Measurements at successive Sites of same Reach.

Comparison No.	1 Site (see last column)	Serial No.	Date, 1878-79.	2 Depth. Above Datum (at Site). h	Variation.	At Solani Aqueduct Gauge.	3 Surface-Fall. Upper 5 miles. F_1+F_2	Lower 4½ miles. F_2	Local Slope. Left Bank. s	Right Bank. s	4 Wind. From Direction.	From Velocity.	To Direction.	To Velocity.	5 Timekeeper's Initial.	7 Cubic Discharge. Partial (at Lower Site). D	Total. D	9 Discrepancy. Gain + Loss − Actual.	Per cent. (of larger).	Probable cause of Discrepancy.	Reference to Sites.
	Embkt.	151	14-12-'78	10·04	−·05	10·03	5·92	5·60	230	?	E	7	..	0	A	..	7,364				
17	L. Aq.	101	„ „	10·00	−·03	10·00	5·95	5·57	183	..	NE	4	S	9	Cl	3,429	7,080	−284	3·9	? ?	
	R. Aq.	108	„ „	9·98	·00	9·98	5·97	5·55	..	175	S	9	?	?	Cl	3,651					
	Embkt.	151	19-12- „	9·91	+·04	9·80	6·00	5·40	228	225	E	4	E ẟ S	8	A	..	7,197			High ($F_1 + F_2$).	
18	L. Aq.	101	„ „	9·87	−·03	·87	5·93	5·47	190	..	SE	*l*	NE	5	C	3,409	6,853	−344	4·8	High F_2.	
	R. Aq.	108	„ „	9·87	·00	·87	„	„	..	200	NE	5	NE	*l*	C	3,444				„ „	
	Embkt.	151	20-12- „	9·88	−·01	9·80	5·90	5·40	228	238	S	3	W	10	A	..	6,940				
19	L. Aq.	101	„ „	9·83	−·01	·83	5·87	5·43	195	..	..	0	W	3	Cl	3,441	6,960	+ 20	·3	? ?	
	R. Aq.	108	„ „	9·82	+·02	·82	5·88	5·42	..	205	W	4	SW	12	Cl	3,519					
	Embkt.	153	15-4-'79	9·43	+·15	9·38	5·82	5·23	265	218	W	9	W	25	P	..	6,185				
20	L. Aq.	103	„ „	9·37	+·03	·37	5·83	5·22	215	..	NW	*l*	SW	12	B	3,034	6,081	−104	1·7	Water rose ·15, and high wind.	
	R. Aq.	110	„ „	9·42	+·05	·42	5·78	5·27	..	200	V	*l*	SW	12	B	3,047					
	Embkt.	153	12-4-'78	9·47	·00	9·43	5·97	4·75	205	228	E	8	E	8	G	..	6,162			.. ..	
21	L. Aq.	103	„ „	9·41	+·12	·41	5·99	4·71	198	..	SE ẟ S	7	NE	8	R	3,107	6,297	+135	2·1	Water rose ·12.	
	R. Aq.	109	„ „	9·51	·00	·51	5·89	4·81	..	190	V	12	E	23	R	3,190				High wind.	
	Embkt.	153	28-5- „	9·50	−·01	9·44	5·96	5·14	243	235	W	7	W	9	G	..	6,187				
22	L. Aq.	103	„ „	9·48	·00	·48	5·92	5·18	205	..	W	6	NW	7	R	3,107	6,330	+143	2·3	? ?	
	R. Aq.	110	„ „	9·42	·00	·42	5·98	5·12	..	188	NW	*l*	V	*l*	R	3,223					
	Embkt.	153	27-5- „	9·45	−·01	9·38	5·92	5·08	220	233	V	*l*	V	*g*	P	..	6,231				
23	L Aq.	103	„ „	9·40	·00	·40	5·90	5·10	210	..	SW ẟ W	8	SW	8	T	3,126	6,248	+ 17	·3	? ?	
	R. Aq.	110	„ „	9·38	·00	·38	5·92	5·08	..	190	S	8	SW	13	T	3,122					
	Embkt.	155	6-4- „	8·75	·00	8·67	5·93	4·74	215	233	W	6	W	6	G	..	5,379				
24	L. Aq.	105	„ „	8·67	·00	·67	5·93	4·74	225	..	NW	2	W	5	T	2,781	5,673	+294	5·2	? ?	
	R. Aq.	112	„ „	8·67	·00	·67	„	„	..	193	W	3	NW	3	T	2,892					

Upper Site, Solani Embankment Main Site;
Lower Site, Solani Twin Aqueducts.

Digitized by Google

25	Embkt.	155	20-3-'78	8·53	−·21	8·48	5·92	4·48	199	230	SW	*l*	WSW	*l*	G	..	5,212	+ 94	1·8	Water fell ·25.
	L. Aq.	105	„ „	8·54	−·12	·54	5·86	4·54	218	..	SW	*l*	..	0	R	2,629				
	R. Aq.	112	„ „	8·41	−·12	·41	5·99	4·41	..	198	WSW	5	WSW	*l*	R	2,677	5,306			
26	Embkt.	157	21-3- „	8·24	·00	8·18	5·82	4·38	204	232	SE	3	V	*l*	G	..	5,070			
	L. Aq.	106	„ „	8·19	·00	·19	5·81	4·39	220	..	SE	3	..	0	T	2,465				
	R. Aq.	113	„ „	8·16	·00	·16	5·84	4·36	..	228	..	0	V	*l*	T	2,669	5,134	+ 64	1·3	? ?
27	Embkt.	157	12-3- „	8·05	·00	7·99	5·86	4·19	200	227	SE	6	SE	8	P	..	4,826			
	L. Aq.	106	„ „	8·00	·00	8·00	5·85	4·20	210	..	SE	6	SE	2	T	2,377				
	R. Aq.	114	„ „	7·98	·00	7·98	5·87	4·18	..	195	..	0	SE	8	T	2,465	4,842	+ 16	·3	? ?
28	Embkt.	159	9-3- „	7·63	−·02	7·55	5·90	3·95	214	255	..	0	..	0	P	..	4,418			
	L. Aq.	107	„ „	7·56	+·02	·56	5·89	3·96	220	..	..	0	N	3	T	2,230				
	R. Aq.	116	„ „	7·55	·00	·55	5·90	3·95	..	203	V	*l*	..	0	T	2,349	4,579	+ 161	3·5	? ?
29	Embkt.	159	8-3- „	7·61	−·01	7·53	5·92	3·93	211	241	W	10	V	*l*	P	..	4,436			
	L. Aq.	107	„ „	7·53	−·03	·53	5·92	3·93	223	..	SW	9	NW	4	R	2,228				
	R. Aq.	116	„ „	7·50	·00	·50	5·95	3·90	..	205	NW	6	NW	*l*	R	2,296	4,524	+ 88	2·0	? ?
30	Embkt.	159	11-3- „	7·60	−·01	7·51	5·94	3·91	218	233	..	0	..	0	G	..	4,452			
	L. Aq.	107	„ „	7·51	·00	·51	5·94	3·91	235	..	..	0	..	0	R	2,211				
	R. Aq.	116	„ „	7·50	·00	·50	5·95	3·90	..	205	..	0	..	0	R	2,305	4,516	+ 64	1·4	? ?
31	Embkt.	159	7-3- „	7·61	·00	7·50	5·90	3·90	213	238	S ẟ W	6	W	7	G	..	4,373			
	L. Aq.	107	„ „	7·50	·00	·50	5·90	3·90	223	..	S	6	..	0	T	2,183				
	R. Aq.	116	„ „	7·50	·00	·50	„	„	..	213	V	*l*	S	7	T	2,256	4,439	+ 66	1·5	? ?

Upper Site, Solání Embankment Main Site;
Lower Site, Solání Twin Aqueducts.

Simultaneous Discharge-Measurements at three Sites.

18 & 8	15th M.	196	19-12-'78	15·17	+·01	9·85	5·85	5·45	213	238	..	0	V	*l*	S	..	6,844			
	Embkt.	151	„ „	9·91	+·04	·80	6·00	5·40	228	225	E	4	E ẟ S	8	A	..	7,197	+ 353	4·9	Water unsteady (see Aqueduct Gauge).
	L. Aq.	101	„ „	9·87	−·03	·87	5·93	5·47	190	..	SE	*l*	NE	5	C	3,409				
	R. Aq.	108	„ „	9·87	·00	·87	„	„	..	200	NE	5	NE	*l*	C	3,444	6,853	− 344	4·8	
19 & 9	15th M.	196	20-12- „	15·10	·00	9·80	5·90	5·23	210	233	..	0	V	*l*	R	..	6,806	+ 134	1·9	
	Embkt.	151	„ „	9·88	−·01	·80	5·90	5·40	228	238	S	3	W	10	A	..	6,940			
	L. Aq.	101	„ „	9·83	−·01	·83	5·87	5·43	195	..	..	0	W	3	Cl	3,441				? ?
	R. Aq.	108	„ „	9·82	+·02	·82	5·88	5·42	..	205	W	4	SW	12	Cl	3,519	6,960	+ 20	·3	
20 & 10	15th M.	197	15-4-'79	14·69	+·10	9·35	5·85	5·20	215	225	V	*l*	SW	14	S	..	6,287			
	Embkt.	153	„ „	9·43	+·15	·38	5·82	5·23	265	218	W	9	W	25	P	..	6,185	− 102	1·6	Water rose ·15, and high wind.
	L. Aq.	103	„ „	9·37	+·03	·37	5·83	5·22	215	..	NW	*l*	SW	12	B	3,034				
	R. Aq.	110	„ „	9·42	+·05	·42	5·78	5·27	..	200	V	*l*	SW	12	B	3,047	6,081	− 104	1·7	

Upper, 15th Mile, New Site;
Middle, Solání Embankment Main Site;
Lower, Solání Twin Aqueducts.

Digitized by Google

ABSTRACT TABLE 31.

CUBIC DISCHARGE-VERIFICATION.

Discharge-Measurements in different Reaches—at same time, or in same water.

Belra, Jaolí, and Kamhera Sites.

The Discharges in the four Distributaries are taken from the official Canal Tables, (from the daily Gauge-Readings). All other Results are actual Experiment, brought forward from Tables L.—LV.

The Field-work of lines Nos. 32—41 was done in nearly same working hours at the three Sites.

That of Nos. 42 to 75 was begun earliest at the Upper Site (Belra), and latest at the lowest Site (Kamhera), time being allowed for the water to pass from the Upper to the Lower Sites.

Simultaneous Discharge-Measurements.

Comparison No.	Date, 1879.	Upper Site. Belra. Depth. Gauge.	Depth. Variation.	Wind. From. Direction.	From. Velocity.	To. Direction.	To. Velocity.	Cubic Discharge.	Lower Sites. Distributaries. Cubic Discharge (Tabular.)	Jaoli. Depth. Gauge.	Depth. Variation.	Wind. From. Direction.	From. Velocity.	To. Direction.	To. Velocity.	Cubic Discharge.	Kamhera. Depth. Gauge.	Depth. Variation.	Wind. From. Direction.	From. Velocity.	To. Direction.	To. Velocity.	Cubic Discharge.	Total Cubic Discharge.	Discrepancy in Discharge. Gain + Loss −. Actual.	Per cent. [of max.]	Probable cause of Discrepancy.
32	9-1	7·50	·00	..	0	..	0	5,751	243	7·28	+·01	V	l	V	l	4,813	5·99	−·02	..	0	..	0	831	5,887	+136	2·3	?
33	10-1	·44	−·02	S	6	..	0	5,739	257	·16	·00	N	6	NE	7	4,643	·98	−·01	V	l	V	l	825	5,725	− 14	·2	?
34	17-1	·04	+·03	N	7	NW	3	5,431	298	6·54	−·02	W	11	W	14	4,201	6·01	−·02	N	10	N	18	863	5,362	− 69	1·3	High wind.
35	21-1	·03	·00	..	0	..	0	5,364	209	·76	−·04	..	0	S	4	4,478	5·61	·00	..	0	..	0	774	5,461	+ 97	1·8	?
36	22-1	·01	+·02	N	3	NW	4	5,309	221	·68	−·02	NW	7	W	17	4,488	·61	·00	N	13	N	15	794	5,503	+194	3·5	High wind. ?
37	25-1	6·76	·00	N	l	..	0	5,311	284	·26	·00	W	6	W	12	4,024	6·11	·00	NNW	9	NNW	10	880	5,188	−123	2·3	High wind.
38	27-1	·70	·00	S	l	..	0	5,142	280	·17	−·04	E	6	E	5	3,970	·14	·00	V	l	..	0	897	5,147	+ 5	·1	?
39	28-1	·44	+·04	..	0	..	0	4,934	280	5·93	−·04	..	0	SW	6	3,646	·12	·00	..	0	V	l	877	4,803	−131	2·7	?
40	30-1	·33	·00	..	0	..	0	4,745	263	·74	·00	..	0	W	6	3,687	·15	·00	..	0	NW	9	900	4,850	+105	2·2	?
41	31-1	·21	·00	NNW	7	NW	5	4,718	255	·60	·00	W.	20	W	25	3,416	·20	+·01	NNW	10	N	23	921	4,592	−126	2·7	High wind.

Digitized by Google

42	3-2	6·02	·00	..	0	..	0	4,582	255	5·42	·00	SW	11	SW	13	3,246	6·34	−·02	NNW	12	NW	7	946	4,447	−135	3·0	High wind.
43	4-2	·28	·00	..	0	..	0	4,791	255	·62	·00	N	3	S	4	3,372	·44	−·02	..	0	V	*l*	948	4,575	−216	4·5	?
44	6-2	·41	·00	..	0	N	*l*	4,801	217	·74	·00	W	14	W	20	3,584	·56	+·03	NNW	18	NNW	18	982	4,783	− 18	·4	High wind.
45	7-2	·37	−·02	..	0	N	*l*	4,791	257	·65	·00	W	9	NW	10	3,325	·51	·00	N	13	N	8	967	4,549	−242	5·1	High wind.
46	8-2	·32	·00	N	*l*	..	0	4,826	247	·85	·00	SW	10	W	11	3,565	5·80	·00	V	*l*	N	7	842	4,654	−172	3·6	?
47	10-2	·27	·00	..	0	..	0	4,724	247	·84	−·04	..	0	N	3	3,617	·55	·00	V	*l*	V	*l*	768	4,632	− 92	2·0	?
48	11-2	5·88	−·05	..	0	..	0	4,415	247	·37	−·06	E	4	SE	4	3,290	·55	·00	..	0	V	*l*	772	4,309	−106	2·4	?
49	13-2	·82	·00	..	0	N	*l*	4,481	217	·34	−·04	W	14	W	25	3,233	·53	·00	N	14	N	14	786	4,236	−245	5·5	High wind.
50	14-2	·74	·00	..	0	..	0	4,248	191	·39	·00	V	*l*	N	3	3,294	·41	·00	..	0	..	0	746	4,231	− 17	·4	?
51	17-2	6·50	+·04	N	*l*	N	*l*	4,718	127	6·31	+·02	N	6	W	4	3,923	·39	·00	..	0	..	0	777	4,827	+109	2·3	?
52	18-2	·53	−·01	N	*l*	..	0	4,941	117	·33	·00	N	4	N	8	4,002	·40	·00	..	0	..	0	761	4,880	− 61	1·2	?
53	20-2	·49	−·01	..	0	..	0	4,777	155	·20	·00	NW	16	W	7	3,844	·28	·00	V	*l*	V	*l*	738	4,737	− 40	·8	?
54	22-2	·41	·00	..	0	..	0	4,830	174	·01	·00	..	0	NW	1	3,758	·54	·00	..	0	..	0	809	4,741	− 89	1·8	?
55	24-2	·98	−·05	..	0	S	*l*	5,149	0	·74	−·08	..	0	S	13	4,330	·47	·00	..	0	V	*l*	744	5,074	− 75	1·5	Water fell ·08.
56	25-2	·79	−·02	..	0	N	*l*	5,083	0	·60	·00	..	0	N	8	4,135	·45	·00	..	0	V	*l*	745	4,880	−203	4·0	?
57	„	·75	−·01	N	*l*	N	7	4,984	0	·57	−·02	N	6	NW	6	4,199	·45	·00	..	0	V	*l*	748	4,947	− 37	·7	?
58	27-2	·51	−·05	..	0	..	0	4,762	0	·23	−·04	W	10	NW	13	3,920	·73	−·01	NW	8	NW	9	824	4,744	− 18	·4	?
59	„	·49	−·03	..	0	N	*l*	4,796	0	·23	·00	W	10	NW	20	3,905	·72	·00	NW	11	NW	11	818	4,723	− 73	1·5	High wind.
60	8-2	·43	−·02	..	0	N	*l*	4,786	0	·19	−·04	NW	10	W	33	3,840	·72	·00	NW	10	NW	11	818	4,658	−128	2·7	High wind.
61	4-3	5·82	·00	V	*l*	N	*l*	4,361	151	5·41	+·04	SW	6	W	25	3,292	·55	·00	V	*l*	NW	15	797	4,240	−121	2·8	High wind.
62	6-3	·91	·00	N	*l*	..	0	4,330	198	·52	·00	NW	11	W	10	3,394	·28	·00	V	*l*	V	*l*	711	4,303	− 27	·6	?
63	7-3	·94	−·03	..	0	..	0	4,284	147	·59	+·02	..	0	NNW	5	3,491	·33	·00	..	0	..	0	734	4,372	+ 88	2·0	?
64	8-3	·92	·00	..	0	..	0	4,288	147	·55	+·10	..	0	SW	8	3,366	·41	+·01	..	0	..	0	734	4,247	− 41	1·0	?
65	11-3	·75	−·05	..	0	N	19	4,166	147	·21	·00	E	11	SE	*l*	3,202	·35	·00	N	6	N	13	748	4,097	− 69	1·7	High wind.
66	13-3	6·67	+·26	S	*l*	..	0	4,900	171	6·11	+·32	..	0	N	11	3,943	·36	·00	..	0	..	0	737	4,851	− 49	1·0	Water rose ·32.
67	15-3	·83	+·14	..	0	..	*l*	5,109	93	·50	+·20	SW	5	W	3	4,146	·30	·00	N	3	V	*l*	726	4,965	−144	2·8	Water rose ·20.
68	17-3	7·29	−·02	N	*l*	N	*l*	5,367	62	7·07	−·04	NW	10	W	20	4,493	·31	−·01	NNW	16	NNW	18	739	5,294	− 73	1·4	High wind.
69	18-3	·20	·00	..	0	..	0	5,324	143	6·86	−·04	W	*l*	SW	9	4,384	·27	−·02	..	0	V	*l*	719	5,246	− 78	1·5	?
70	20-3	6·86	−·08	..	0	..	0	5,174	150	·29	−·06	W	8	W	11	3,983	6·21	−·01	N	11	N	11	909	5,042	−132	2·6	High wind.
71	21-3	·53	−·02	..	0	..	0	4,815	140	·05	−·06	W	8	W	14	3,701	5·89	·00	N	13	N	13	838	4,679	−136	2·8	High wind.
72	22-3	·51	−·01	..	0	..	0	4,781	150	·01	+·02	SW	8	SW	17	3,878	·88	·00	NW	12	NW	11	863	4,891	+110	2·3	High wind.
73	24-3	·45	−·01	..	0	..	0	4,725	51	·09	+·04	W	20	W	29	3,923	·69	+·02	NW	11	NW	10	800	4,774	+ 49	1·0	High wind.
74	25-3	·90	·00	..	0	S	11	5,193	38	·53	+·02	E	17	E	17	4,209	·75	−·01	E	9	E	9	818	5,065	−128	2·5	High wind.
75	27-3	7·54	−·07	..	0	..	0	5,432	27	7·32	−·12	..	0	..	0	4,754	·54	·00	..	0	..	0	755	5,536	+104	1·9	Water fell ·12.

Digitized by Google

Nature of Work.		SITES.	Serial No.	Number of Sets.	RANGE OF EXTERNAL CONDITIONS AND OTHER DATA.								
					At ends of Reach.				At Experimental Site.				
					Head-Gauge.	Withdrawal by Distributaries. Q	Tail-Gauge.	Obstruction at Tail.	Gauge-Reading.	Depth on Expl. Vertl., or Hydr. Mean	Central Depth. H	Surface-Breadth. b	Wind Velocy.
VERTL. VELY.-CURVES.	CENTRAL.	Solání Left Aqueduct, ..	1- 4	58	8·6—5·2	Not observed.	4·0—3·2	?	9·5— 5·9	9·5—5·9	9·5— 5·9	85— 82	30—0
		Solání Right Aqueduct,	5- 17	165	9·4—5·3		4·7—2·3	?·47—0	10·0— 5·6	10·0—5·6	10·0— 5·6	85— 82	25—0
		Solání Right Aqueduct, [Left Aqueduct closed].	18- 20	22	4·5—4·0		2·8	?	4·7— 3·9	4·7—3·9	4·7— 3·9	85	12—0
		Solání Embankment, [Main Site].	21- 28	99	9·2—4·1		4·2—2·5	?·67—0	9·8— 4·9	11·0—6·0	11·0— 6·0	170—155	21—0
	NON-CENTRAL.	Solání Right Aqueduct,	29- 40	154	8·8—6·7	Not observed.	4·0—3·3	?0—0	9·6— 6·9	9·6—6·9	9·6— 6·9	85— 82	21—0
		Solání Embankment, [Main Site].	41- 46	67	9·3—6·7		4·3—3·3	?0—0	9·7— 7·5	8·9—2·5	10·9— 8·7	169—162	25—0
TRANSVERSE VELOCITY-CURVES.	SURFACE.	Solání Left Aqueduct, ..	51- 52	29	8·2—7·9	Not observed.	3·9—3·8	?0—0	9·1— 8·8	7·4—7·3	9·1— 8·8	84	15—0
		Solání Right Aqueduct,	53- 59	70	9·4—7·0		4·4—3·3	?—0	10·0— 7·5	7·9—6·5	10·0— 7·5	85— 82	23—0
		Solání Embankment, [Minor Sites].	60	10	8·1—8·0		3·9—3·8	?	9·7— 9·5	?	10·3—10·2	169—168	27—0
	MID.	Solání Right Aqueduct,	61- 62	17	9·5—8·3	?	4·3—4·1	?0—0	10·1— 9·1	8·0—7·5	10·1— 9·1	84— 82	19—0
	BED.	Solání Right Aqueduct,	65- 66	7	9·5—7·8	?	4·3—3·7	?0—0	10·0— 8·7	8·0—7·3	10·0— 8·7	84— 82	20—0
	MEAN VELOCITIES.	Solání Left Aqueduct, ..	101-107	45	9·4—6·7	266— 0	4·5—3·3	?—0	10·0— 7·4	7·9—6·4	10·0— 7·4	85— 82	20—0
		Solání Right Aqueduct,	108-127	174	9·4—1·3	333— 0	4·5—1·4	?3·08—0	10·0— ·7	8·0— ·7	10·0— ·7	85— 82	23—0
		Solání Right Aqueduct, [Left Aqueduct closed].	131-139	12	3·6—1·4	247—50	4·3—2·3	?3·08—0	4·6— 2·6	4·2—2·5	4·6— 2·6	85	12—0
		Solání Embkt., Main site,	151-181	153	9·4—1·2	285— 0	4·5— ·9	?2·67—0	10·0— ·4	9·3—1·7	11·2— 1·5	171—150	27—0
		Fifteenth Mile, ..	191-197	17	9·3—6·3	268— 0	4·3—3·2	0	15·3—12·5	9·5—8·4	11·0— 8·2	186—171	14—0
		Belra, ...	201-206	53	3·6—1·8	298— 0	3·6—3·0	·56—0	7·5— 5·7	9·0—7·6	9·9— 8·0	189—187	19—0
		Jaolí, ...	211-217	55	6·6—4·2	100— 0	3·8—2·8	1·00—0	7·3— 5·2	7·8—6·3	8·7— 6·7	193—191	33—0
		Kamhera, ...	221-225	56	2·3— ·9	102— 0	3·8—3·1	1·26	6·6— 5·3	4·8—4·1	5·7— 4·4	66— 64	23—0
		Distributaries Right Jaolí, ..	231-232	4	?	Not required.	?	?	4·4— 3·1	2·8—2·0	3·8— 2·6	25— 22	0
		Distributaries Mansúrpur, ..	233-234	5	?		?	?	4·1— 3·6	2·3—2·1	3·6— 3·1	14	l—0
		Distributaries Míranpur, ..	235-236	3	?		?	?	3·8— 2·8	1·6—1·2	2·1— 1·4	14	h—0
		Distributaries Pimora, ..	237-238	4	?		?	?	3·8— 3·3	2·2—1·9	3·4— 2·9	13	b—0

Hydraulic Mean Depth.

Digitized by Google

See upper half of Table.

Nature of Work.		SITES.	Serial No.	Number of Sets.	RANGE OF RESULTS.															
					SURFACE-FALL. Sub-Reaches. Upper. F_1	Middle. F_2	Lower. F_3	CHIEF VELOCITIES. [Each entry is mean of 3 trials.] Surface or Central. v_o or U_o	Mean. U or V	$U \div v_o$ or $V \div U_o$ c or c	DISCHARGE. Supl. or Cubic. in sq. ft. or c. ft. per sec. D or D		CENTRAL SURF. VELOCITY. [Each entry is mean of 46 trials.] Expts.	Velocity. v_o	Ratio $V \div v_o$ c	SURFACE-SLOPE. Expts.	Slope. S	Ratio $V \div w$ C	
VERTL. VELY.-CURVES.	CENTRAL.	SOLANI SITES.	L. Aqueduct, ..		58	5·9—5·6	No Middle Sub-Reach.	5·4— 2·5	Surface (v_o).	4·69—3·45	4·20—3·26	·96—·94	39— 19	Superficial (D).	..		..	0	?	Slope seldom observed.
			R. Aqueduct, ..		165	6·6—5·8		5·5— 2·5		4·88—3·51	4·73—3·55	1·01—·96	47— 20		..	see previous column of v_o.	..	25	300—143	
			R. Aqueduct, .. [L. Aqueduct closed].		22	6·7—6·3		1·7— ·9		7·66—5·31	6·58—5·27	1·00—·97	31— 21		..		..	0	?	
			Embankment, [Main Site].		99	5·3—4·5	1·5— ·9	5·5— 1·1		4·65—2·67	4·45—2·54	1·00—·93	48— 15		..		..	5	238—193	
	NON-CENTRAL		R. Aqueduct, ..		154	6·1—5·7	..	5·4— 3·9	Surf. (v_o).	4·35—2·05	4·27—2·51	1·13—·96	40— 18	Supfl. (D).	..	Not observed.	..	13	?356—190	
			Embankment, [Main Site].		67	5·2—4·5	1·4—1·1	5·4— 3·6		3·57—2·34	3·54—2·20	·97—·89	23— 6		..		..	16	233—200	
TRANSVERSE VELOCITY-CURVES.	SURFACE.	SOLANI SITES.	L. Aqueduct, ..		29	5·8—5·7	No Middle Sub-Reach.	5·0— 4·8	Central (v_o).	4·48—4·00	4·00—3·71	·91	340— 315	Supfl. (D).	..	see previous column of v_o.	..	0	?	Slope seldom observed.
			R. Aqueduct, ..		70	7·2—5·7		5·5— 3·8		5·13—3·85	4·61—3·60	·94—·91	392— 306		..		..	17	233—178	
			Embankment, [Minor Sites].		10	5·8—5·7		5·0— 4·9		4·55—3·90	4·21—3·94	·96	708— 661		..		..	0	?	
	MID.		R. Aqueduct, ..		17	6·1—5·7	No Middle Sub-Reach.	5·7— 4·7		4·88—4·26	4·54—4·10	·96—·93	378— 348		..	Not observed.	..	1	210	
	BED.		R. Aqueduct, ..		7	6·1—5·8		5·6— 4·8		4·55—3·57	4·24—3·42	·95—·94	361— 291		..	Not observed.	..	0	?	
	MEAN VELOCITIES.	SOLANI SITES.	L. Aqueduct, ..		45	6·0—5·6	No Middle Sub-Reach.	5·6— 3·9	Central Mean, (U_o).	4·44—3·37	4·12—3·34	·98—·94	3,441—2,131	Cubic (C).	1	4·05	·85	16	285—183	1·06— ·89
			R. Aqueduct, ..		174	7·8—4·3		5·7— ·1		4·69— ·57	4·35— ·60	1·05—·90	3,651— 36		56	4·78—1·83	·92—·84	78	330—113	1·19— ·66
			R. Aqueduct, .. [L. Aqueduct closed].		12	6·5—3·6		1·0— ·0		5·17— ·71	4·87— ·69	·97—·87	1,648— 212		10	5·79—1·42	·89—·79	10	480—024	1·30—1·05
			Embkt., Main site,		153	7·6—3·4	2·1— ·1	6·0— ·0		4·55— ·41	4·11— ·44	1·10—·89	7,364— 114		71	4·70— ·83	1·01—·80	92	323—038	1·07— ·85
			Fifteenth Mile, ..		17	2·8—2·1	3·8—3·6	5·5— 3·7		4·55—3·66	4·16—3·51	·96—·91	7,187—4,370		17	4·91—4·21	·91—·82	16	253—?215	?·96— ·83
		LOWER SITES.	Belra, ...		53	1·2— ·4	No Middle Sub-Reach.	4·1— 2·4		3·47—2·67	3·27—2·79	·99—·97	5,765—4,064		47	3·78—3·26	·92—·82	50	255—168	·81— ·66
			Jaolí, ...		55	·6— ·2		5·6— 3·5		3·37—2·65	3·06—2·57	·97—·93	4,813—3,202		53	3·55—3·02	·92—·80	51	183—129	·93— ·78
			Kamhera, ..		56	3·1—2·6		11·9—10·2		3·33—2·52	2·95—2·63	·98—·93	982— 711		50	3·54—2·90	·94—·81	50	318—267	·82— ·74
		DISTRIBUTARIES.	R. Jaolí, ..		4	No Observations.				2·73—2·24	2·52—2·10	·94—·91	191— 98		2	2·95—2·51	·85—·84	..	Slope not observed.	..
			Mansúrpur, ..		5					2·48—2·26	2·14—2·03	·90—·89	91— 73		3	2·49—2·43	·86—·84	..		..
			Míranpur, ..		3					1·67—1·58	1·59—1·49	·95—·94	41— 25		1	1·79	·83	..		..
			Pimora, ..		4					2·13—1·92	1·84—1·71	·88—·87	63— 48		2	2·26—2·09	·86—·81	..		..

Digitized by Google

ABSTRACT TABLE 33.

SPECIMEN FIELD BOOK.

Details for Series **201**, *line* 2, (9-1-'79).

NATURE OF WORK, *MEAN VELOCITIES.* DATE, *9-1-'79.*

Place, *Belra Site.*
Run, *50 feet.* Watersurface, *188·49 feet.*
Vertical of Experiment, (*see "Explanation"*). Instrument, 1" *tin Rods.*
Gauge-Reading, (1), *7·50.* (2), *7·50.* (3) .. .. (4) ..
Wind (1), *None.* (2), *None.* (3) .. .. (4) ..
Commenced, *1-10 p.m.* Ended, *4 p.m.*

Abscissa.	No.	First Set. Times. U.	First Set. Times. L.	First Set. D.	First Set. M. D. v.	Second Set. Times. U.	Second Set. Times. L.	Second Set. D.	Second Set. M. D. v.	Remarks. [Rods used].
m, L	1	9	55	46	48·50		If a second SET of similar Field-work were done on same day, the entries would be made here. The Gauge-Readings and Winds at beginning and end of second Set would be entered as Nos. (3), (4) in the Heading.			2′
	2	2·5	56	53·5	2·06					
	3	15	61	46						
90′, L	1	9	50	41	40·33					5′
	2	3	41	38	2·48					
	3	12	54	42						
80′, L	1	9	40	31	31·00					8′
	2	3	34	31	3·23					
	3	18	49	31						
70′, L	1	7·5	36	28·5	29·50					8½′
	2	15	47	32	3·39					
	3	3	31	28						
60′, L	1	7	37	30	30·67					8½′
	2	14	44	30	3·26					
	3	9	41	32						
40′, L	1	7	38	31	30·00					8½′
	2	4	34	30	3·33					
	3	9	38	29						
20′, L	1	1	31	30	30·50					9′
	2	5	37	32	3·28					
	3	14·5	44	29·5						
Centre	1	9	41	32	31·33					8½′
	2	22	54	32	3·19					
	3	6	36	30						
20′, R	1	9	39	30	27·83					8½′
	2	1·5	29	27·5	3·59					
	3	7	33	26						
40′, R	1	3	34	31	31·00					9′
	2	12	42	30	3·23					
	3	5	37	32						
60′, R	1	1	30	29	28·67					9′
	2	8	35	27	3·49					
	3	5	35	30						
70′, R	1	3	36	33	30·00					9′
	2	6	33	27	3·33					
	3	6	36	30						
80′, R	1	4	37	33	33·00					8½′
	2	3	36	33	3·03					
	3	10	43	33						
90′, R	1	1	44	43	40·33					4′
	2	6	45	39	2·48					
	3	17	56	39						
m, R	1	1	65	64	53·00					1½′
	2	8	57	49	1·89					
	3	12	58	46						

Explanation.—This Form served for velocity-work past either a vertical or transversal. The present specimen (Mean Velocity work) is of latter sort.
[In the former case the "position" of the Vertical of Experiment would have been filled up in the Heading; and the word "Depth" substituted for Abscissa at head of left Column.]

Heading. {The portion of the Heading in italics was filled in the Field. The rest of the Heading was ready printed.
The Gauge-Readings and Wind Entries Nos. 1, 2 are those noted at beginning and end of the First Set of velocity-work.

Columns. {The Column "Abscissa" shows the distance (± *y*) of each Float-Course to right or left (R, L) of centre.
The Columns U, L contain the number of chronometer-beats counted as passage of each Float under the Upper and Lower Ropes respectively.
Column D contains the difference between the numbers in Cols. U, L, *i.e.*, the time (in half seconds) of passage of each Float through the 50′ "Run."
Col. M. D. and *v* contains two entries; whereof the upper (M. D.) is the "mean difference," (mean of each trio of differences in Col. D), *i.e.*, the mean time of passage through the 50′ "Run", and the lower (*v*) is the velocity corresponding, (which may be taken by inspection from a Table of Reciprocals).
The velocities (*v*) were filled in in office. The rest of the entries were made in the field.

Digitized by Google

SPECIMEN OF COMPUTATION OF CUBIC DISCHARGE.

BELRA SITE.

These are the details of computation of the Discharge-Result (D) shown in line 2 of Series 201, 9-1-'79.

Date, 1879.	Gauge-Reading. h	Surface-Breadth. b	Description of Line.	STEP I. COMPUTATION OF DISCHARGES (D = Hu) PAST EACH VERTICAL.															
				Simson's		Cubic				Weddle's			Cubic					Simson's	
				Left of Centre.									Right of Centre.						
				Edge.	m	90	80	70	60	40	20	Centre.	20	40	60	70	80	90	m	Edge.
8-1	7·52	188·51	Soundings[1],	..	..	6·41	9·51	9·83	9·78	9·50	10·13	9·65	10·13	10·28	10·48	10·36	9·71	6·01	..	..
9-1	7·50	188·49	Depths[2], H =	0	4·25	6·39	9·49	9·81	9·76	9·48	10·11	9·63	10·11	10·26	10·46	10·34	9·69	5·99	4·25	0
			Rod-velocities[3], u =	?0	2·06	2·48	3·23	3·39	3·26	3·33	3·28	3·19	3·59	3·23	3·49	3·33	3·03	2·48	1·89	?0
			Discharges[4], Hu past each vertical,	0	..	15·85	..	..	31·82	..	33·16	30·72	36·29	..	36·51	..	..	14·86	..	0
				..	8·76	..	30·65	33·26	..	31·57	..	30·72	..	33·14	..	34·43	29·36	..	8·03	..

	Simson's	Cubic	Weddle's	Cubic	Simson's
STEP II. COMPUTATION OF CUBIC DISCHARGE.	4 × 8·76 = 35·04 15·85 6)50·89 8·48 4·25	3 × 63·91 = 191·73 47·67 $\frac{3}{8}$ × 10 = $\frac{30}{8}$ 239·40 30 8)7182·00	5 × 95·43 = 477·15 168·50 645·65 $\frac{3}{10}$ × 20 = 6	3 × 63·79 = 191·37 51·37 $\frac{3}{8}$ × 10 = $\frac{30}{8}$ 242·74 30 8)7282·20	4 × 8·03 = 32·12 14·86 6)46·98 7·83 4·25
Total Cubic Discharge D = 5751·25. = Sum of	.. .. .. 36·04	.. .. 897·75	.. .. .. 3873·90	.. .. .. 910·28	.. .. .. 33·28

[1] The Soundings are deduced from Detailed Table II. [2] The depths (H) are obtained by subtracting the fall (·02) of water-level from the Soundings except at the m-Pendants, the depth at which is—(since the side-slopes are 1 in 2)—accurately given as ½ × difference of surface-breadth 188·49) and bed-width (180′). [3] The Rod-velocities (u) are taken direct from the Field-Book (Table 33). [4] The products Hu are ranged in two lines so as to admit of rapid addition of the ordinates (horizontally by inspection) as required in the several formulæ (Weddle's, Cubic, Simson's).

Digitized by Google

END OF TABLES.

Digitized by Google

Digitized by Google


89090522293
B89090522293A

Digitized by Google